THE BUILDER

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WEST FRONT, FURZE HILL, WILLERSEY. MR. J. L. BALL, ARCHITECT.
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THE MASQUE OF COLUMNS.

THE saying that architecture is history in stone is true in that it must inevitably express more or less of the character of the time, place, and folk it springs from. This is not to say that England has been successively Roman, Greek, Mediæval, and variously Renaissance in character, according to the varying phases of her architecture in the last century and a half. But the fact that for that period the great generalising Mother Art has herself so completely succumbed to the caprices of that fickle jade Fashion—sometimes lightly mistaken for the deep, inscrutable Spirit of the Age—is a phenomenon as notable in this connexion as the development of the true styles.

This period, commencing about the middle of the XVIIIth century, corresponding with what has been aptly called the palæotechnic age of mechanical ndustrialism, finds no more fitting symbol than the cylinder or heart of the steam-engine. From its throbbing ventricle, more than from any invention previously sought out by man—who was made upright—has flowed an expansive energy to the piling up of riches and the spreading of men, on the one hand, over the earth even to its utmost recesses; concentrating, hurling them together, on the other, in more or less formless and chaotic conglomerations, which we, architects among the rest, are beginning now against mighty odds to reduce to the order of cities where men may live a common life to noble ends.

Of the same kindred—successors architecturally to those multitudinous refuge towers with which pugnacious mediæval burghers found it useful to adorn their towns, ere the business of fighting became a state monopoly forbidden to private enterprise—are those tall dark columns that with fantastic smoke capitals support the murky dome with which the said conglomeration is often crowned. The ancients would certainly have given them picturesque names, as of infernal monsters, hiding with their foul vapours the blue dome of Father Zeus and the eye of his bright son, so that the affrighted Muses, no longer worshipped, are fled away.

It would be quite easy to show how completely civilised man has, in this mechanical age, fallen under the spell of the cylinder. His food, clothing, shelter, all his instruments of use and beauty own its sway, in infinite variety of dimension and proportion, from the all-potent circulating golden disc to electric cables encircling the earth. Amid a myriad instances we are arrested by the notable phenomenon that, roughly synchronising with the coming of the steam cylinder at the basis of society, and the high hat as its crowning glory, architecture again became completely obsessed with that most noble of cylinders, the Grecian column.

This had, of course, first happened some time previously, especially under the influence of the great Italian architect whose name is reminiscent of that

adopted by Pallas Athene from a reprehensible sort of giant, whom she, as goddess of intelligence and the liberal arts, very properly slew; and then, with taste more questionable in a serious virgin divinity, adopted his skin also.

At the period we speak of the cult of the column received fresh impetus from the published works of Sir William Chambers, Stuart and Revett, and others; and architecture showed a renewed tendency to produce cylindrical forms whenever exigencies of construction or ornament made it possible. That which in its origin had been the noblest and most purposeful of architecural features became the hackneyed drudge of clever draughtsmen and decorators. Colonnades and porticoes, natural and right in the brilliant South, were repeated everywhere as decoration in our duller clime. Scholarly care was taken in proportioning the column and its entablature, but their spacing was treated with an airy freedom no stone architrave could stand, so that they became skewback arches or obvious shams with impossible jointing. The chief beam became no beam at all, which perchance was typical of the time, as architecture we have said must be. Doric and Corinthian columns of huge proportions were duly set on pedestals in lonely state, with the unfortunate statue of a sea lion or royal duke skied upon their abaci; an Ionic column, graceful symbol of massive strength, would be hoisted as a burden on the back of a church to weigh it down to earth, in place of the Gothic spire that did at least point upwards. These and many such like things they did, and we do still; and with our steel construction indeed we often go one better. Imagine, for instance, the shades of Iktinos and Hippodamos reeling along from vertigo to nightmare and standing agape and speechless at last before the Blondin-at-Niagara effect of a 36-ft. column balanced above an expanse of sheet glass. Recovering from their aphasia, might they not, like a certain great personage, well say, "Wonderful, wonderful! But promise me never to do it again"?

Able, and indeed scholarly, men did these things, believing themselves inspired by the spirit of classic culture. But the cylinder had woven its spell over them. In their scholarship and artistry, while scorning not to use and profit by its power, they affected to despise its base mechanic form, saying loftily that no artistic expression was possible for it and its works; and the swart, restless demon that lurked in it took a terrible revenge and wrought havoc on our cities, towns, and villages. They became bloodless and atrophied, or swollen to shapeless masses and all their features marred with fell disease. Where the goddess of culture and the arts yet lingered she covered herself with the skin of dead giants, and turned against the smitten towns her shining ægis, so that they saw themselves writhing with the horrors of the Gorgon's head, and their heart and its sympathies turned stone-like in the cold glare. Even the brilliant and high-minded enthusiasts of the Gothic revival could not break the spell: and in the Renaissance revived—or still-born—that in many fashions and individual eclecticisms has prevailed since the battle royal of the styles, the classic column survives with even growing effect to-day.

We are so like those intellectual, beauty-loving Greeks, those Imperial conquering Romans—the explanation goes—so like those brilliant Pagans of the Renaissance. And perchance we are: in more ways than we mean, or care to think about. We have no more use—it goes on—for our own home-grown mediæval style; we agree with those men of taste—it is mere Gothic! Classic is much more suitable to our modern requirements and culture. It is a large and comforting assumption which for the moment has the support of appearances. But appearances are not absolutely safe guides for finite reason; as, of course, the ancients were aware in that fable of the Divine Intelligence wrapped in the skin of the earth-born giant. To rest on this assumption is to forget certain other things, as, for instance, that classic architecture, even if it be more amenable to modern wants, had already passed, as Gothic had not, through that mighty hammering and forging and shaping thereto by the giants and Titans of the great Renaissance age; and also that even now it does not fit so very well, but necessitates much padding and screening of the actual construction, much shrinking and altering of the dead skin to give it any semblance of style.

A varying Classicism holds the field; in our public and great commercial buildings at present, after many vicissitudes, tending back again to a severe purity and massiveness of treatment; and this concurrently with the development of progressively scientific methods of construction, enabling us, with perfect security and economy, to combine lightness and strength to a degree undreamed of even by the daring builders of Beauvais. In these circumstances it would be really interesting to learn in what consists the special appropriateness of the classic column which, scarce altered in twenty-four centuries, is now again the dominating feature of our architecture. There is no doubt plenty of archæological precedent, where not in Greek, at least in Roman and Renaissance times, for most of the modern uses and misuses it is put to. But this fact remains—that with the Greeks it was ever a beautiful factor of architecture, not merely expressing but actually one with the essential structure of buildings, and with us it is, for the most part, not so.

We have heard it suggested sometimes that the Greek architects of the Periclean age were probably more qualified to deal successfully with our modern problems than any who have succeeded them. Such propositions can only tease us out of thought. It is at least as probable that in the same conditions as have led us moderns to the present position the old Greeks had all the qualities and defects of character to have landed them in a quite analogous impasse. All such speculations are futile. We can at best only see how they solved the problems of their own requirements with their own methods and materials; and present ideals of architecture seem to us to show but a limited appreciation of the great lessons of Greek art, a quite unintelligent following of its much-admired example, in applying, with whatever scholarship and ingenuity, its beautiful constructional forms to much more complex buildings of quite different methods and materials of construction.

The question of Greek, Gothic, or Renaissance in relation to modern requirements and ideas is, in fact, of quite secondary and academic interest. The first real problem to be solved ere architecture can again take its place as a consistently developing art is the reintegration of the two elements of structural efficiency and beautiful æsthetic expression in its actual factors. These elements were in perfect union in Greek and Gothic, but the development of steel construction emphasises the disharmony between them which set in with the Renaissance. While this remains there can be no real advance. Pallas Athene must free herself from the skin of the dead giants and appear again in her own rich variously broidered peplos as the patroness of a living culture in which science and art react in perfect and fruitful accord.

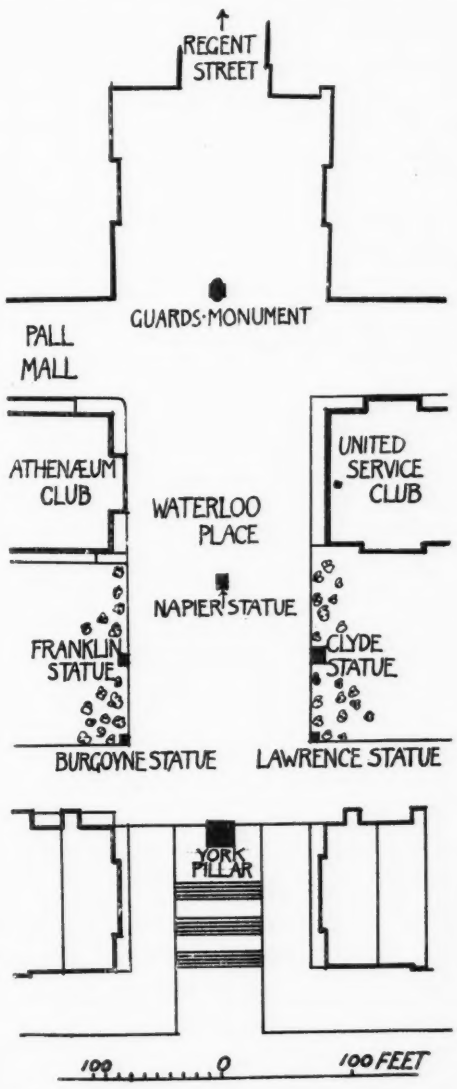
The utilitarian advantages of steel construction are as undeniable as of other mechanical products of the great age we have symbolised by the steam cylinder. That age has given man unprecedented control of natural resources and powers; but it has used them crudely, wastefully, often cruelly, as a giant unaware of his strength. Its motto has been Quantity rather than Quality. The finer æsthetic perceptions and faculties of art have been divorced from its utilitarian ends and trampled on in the rush of competitive commercialism; the common wealth has been neglected in the struggle for private wealth; machinery has become too much the master of man, instead of his very obedient servant. But there are signs all around of a new day breaking. The Palæotechnic, with its steam power, is merging in the Neotechnic, the symbol of which is the electric cable branching and rebranching into every dwelling and working place.

We may not stay now even to hint what this alone will mean in the cleansing and revival of our cities, towns, and villages: once it is politically and administratively, as it already is scientifically and practically, possible. In those marvellous manual tools, delicately subject to hand and eye and brain of the skilled worker, but supplied with power by its own electric nerve, we see, as in many other evidences, the promise of an era in which technical problems now apparently insoluble will find solution through the truer mastery and application of machinery. The thought upon which we close is that the arrested tradition of architecture is more likely to be restored to a renewed and living development by aiming, both in training and in practice, at an all-round technical efficiency and sincerity, rather than by conscious and direct attempts to create a fitting beauty out of the forms proper to past ages. This, in fact, is the greatest lesson that both Grecian and Gothic building can teach.

KING EDWARD MEMORIAL.

THE much-debated question of a site for the King Edward London Memorial has once more come to the fore, this time with a suddenness which is almost dramatic. There are many who have contended from the first that the proposed site at the Piccadilly end of the new grass walk in the Green Park was not by any means an ideal one, and readers of the *Builder* will remember that just after the announcement that it had been provisionally adopted we wrote :—"The only thing left now is to try and make the best of a bad job. If it is definitely determined to place a monument of this description so that it spoils the vista from Piccadilly to the Queen Victoria Memorial and turns its back on Piccadilly, it might perhaps be well to carry the idea to its logical conclusion by ignoring Piccadilly altogether." Similar thoughts have evidently been disturbing those in whose hands the final decision rests, and it is with no slight feelings of satisfaction that we read the letter which the King has recently addressed, through Lord Stamfordham, to the Committee, with the result that at their meeting at the Mansion House on the 19th inst. drastic steps were immediately taken. It was decided then and there to abandon the Green Park site and consequently any designs or contracts that had already been entered into with regard to it, and on his Majesty's suggestion the Advisory Committee will proceed to negotiate for an equestrian statue of King Edward to be placed in the open space at the bottom of Waterloo-place between the Athenæum and the United Service Clubs.

If a ready-made site is to be selected, this one has much to commend it, but it is to be hoped that it will not be utilised without due consideration being given to its limitations. From the sketch plan reproduced herewith it will be seen that this locality bristles with monuments of one kind or another already. This is not itself an objection, but when one realises that the York Column dominates, and from its lofty proportions is bound to dominate any monument near by, we feel that a serious drawback presents itself. But this is not all, for the Guards' or Crimea Monument stands on the same axial line, and closes the vista—all too soon—as one looks down from the rising ground of Regent-street. The removal of the statue of Lord Napier of Magdala to the vacant pedestal in Trafalgar-square is contemplated as a first step towards the realisation of the scheme, but we are inclined to think that unless an unfortunate gradation in the height of three monuments in a row is to result the Guards' Monument should be removed as well. The question of the lay-out of this area would also need to be considered very carefully, for, although the space available—no more than about 150 ft. in width between the two clubs—is small, in view of the national importance attaching to the monument of so great and so beloved a Sovereign something must needs be done to correct the drab appearance of what strikes many at the moment as a dreary waste. By removing the Guards' Monument as well as the Napier statue, and by placing the new memorial on a lofty and spreading podium further forward on the axial line so that it would not be hidden entirely from Pall Mall, and by a general rearrangement of the *entourage*, we can imagine a dignified result, but we would have welcomed a more spacious site allowing of a grandiose scheme giving opportunity for the more expansive co-operation between architect and sculptor. London is not fortunate in the disposition of its open spaces, but



Plan of Waterloo Place, showing the site selected for the King Edward Memorial with its immediate surroundings.

perhaps this one offers fewer disadvantages beyond remedy than any of the others which have been proposed.

We feel that if the exact position and height of the monument are arrived at—preferably experimentally by placing plaster casts *in situ* at an early stage—so that the whole may be in scale with its surroundings, the selection of this site may prove to be the happy solution of a problem that would soon have been settled in almost any other capital city in the world, but one which, characteristically enough, has sorely taxed the resources of the greatest capital of all.

GYMNASIUM AND HALL, LORETTO.

A new gymnasium and hall has been presented to Loretto School by Mr. Harry Brock, Dumbarton. Sir Robert Lorimer, F.R.I.B.A., Edinburgh, was the architect, and the building has cost 2,000*l*. It is fitted with a stage and proscenium.

NOTES.

The Power of Design. IT is undeniable that his knowledge and power of design is what discriminates the architect from other men—is, in fact, his whole art, to which all else that he does is accessory. To avoid misunderstanding this needs some definition; for obviously there are many others of whom the name designer is rightly used. But in no other art does it apply in so rich and comprehensive a sense, or require such varied qualities and attainments. There is but one power of architectural design, not many, nor even two, as might be inferred from the frequent allusions to æsthetic and structural design. It is a unity of two intimately related and interacting elements: the plan—that is, the ordering and arrangement for a definite purpose—and the construction which gives that order enduring form; the first requiring in the designer an intimate and practical knowledge of life in all its different phases for which buildings are required, the second a scientific knowledge of the physical and mechanical properties of materials. These two elements are the essential components of architectural design. Yet the ability of the expert and practical planner and of the scientific constructor may stop short of the power that discriminates the true architect. What is still wanting is not so much another element as a quality or enhancement of the planning and construction, that depends less upon what the designer knows than upon what he is. The most perfect knowledge of the architectural beauties of past times, the highest powers of draughtsmanship, may yet leave a man as much a specialist as a constructional engineer, as merely a decorative artist as a designer of wall-papers. All these things are necessary; but knowledge and power of design is not to be taught or attained by treating them in so many watertight compartments. They will not be learnt or attained at all in the absence of natural aptitude and faculties to conceive an order, purpose, and fitness in architecture that transcends the necessary utilitarian requirements of buildings. Hence the importance, from an educational point of view, of a right understanding of what power of design means in architecture.

Designer and Specialist. IN upholding the importance of architectural design we are very far from wishing to disparage the specialist in the smallest degree. Specialism is one of the most striking phenomena of modern science, art, and industry, and that to which they owe a great development in many directions. But as professor of the great generalising art—the synthesis of useful and fine arts—the architect is something very different from a specialist. He co-ordinates and controls the work of many specialists. His relations to them have been, for the most part, satisfactorily settled by long practice and custom; and if they are less satisfactory in relation to certain of the more modern types of specialists the reason is perhaps to be found—at least, in part—in his tendency to specialism himself, either, as he says, in the practical,

scientific, or artistic side of his profession. Tending towards the more attractive and abstract studies of his art he finds the mathematics of modern steel construction—to take one most characteristic instance—irksome; and so comes to depend too much upon the utilitarian specialist in one of the essential factors of true architectural design. Would architects but study to understand the properties of steel and concrete as they do those of wood, brick, and stone, there is no reason to doubt but that designer and specialist would soon find their normal and true relation, here as elsewhere, with great advantage to architectural design.

Smoky Chimneys.

VERY few persons when they enter into an agreement or lease to take an unfurnished house think of ascertaining whether the chimneys smoke, yet, as there is no warranty on the part of the landlord in the case of unfurnished houses that they are fit for habitation, this is a very necessary precaution, as has been proved in a case recently tried in the City of London Court, Audoire and Hartfree *v.* Bisgood. In an action for a quarter's rent for premises let on a three years' agreement the tenant counter-claimed for 180*l.*, the amount of the three years' rent, on the ground that the chimneys smoked so badly that the house was uninhabitable and even dangerous, and the defect was incurable. The defence failed, the judge observing that, although the defects might have justified the defendant in refusing to commence his tenancy, they did not justify him in determining it without proper notice. The law is unquestionable, but intending tenants will do well either to have the chimneys tested or to obtain an express guarantee from the landlord before entering into possession of unfurnished premises.

SOUTHWARK BRIDGE RECONSTRUCTION.

IN previous issues we have referred to the general unsuitability of Southwark Bridge for vehicular traffic and to various proposals made for remodelling the structure so as to render it of practical service as a cross-river communication.

The City Corporation have now decided upon the entire reconstruction of the bridge in accordance with the designs of Messrs. Basil Mott & Hay, MM.Inst.C.E., and a contract for execution of the works has been entered into with Sir William Arrol & Co., Ltd.

As our readers will remember, the existing bridge, built in 1814-19 by Sir John Rennie, comprises three cast-iron arches of 210 ft., 240 ft., and 210 ft. respectively, with the clear headway of 29 ft. above Trinity water-mark under the middle span. Owing to the position of Upper Thames-street, the northern approach is necessarily short and steep, another undesirable feature being the slope of Queen-street, on the northern side of Upper Thames-street.

The only really effective solution of the problem is to design the northern approach on the lines adopted in the case of London Bridge, levelling Queen-street and Queen-street-place, and carrying the roadway on an arch thrown across Upper Thames-street.

This solution, which we have advocated on previous occasions, would undoubtedly be costly, owing mainly to the alterations entailed to buildings on either side of the remodelled streets, but we are sure that the outlay would be amply repaid by the establishment of a level main thoroughfare between the City and Southwark.

Unfortunately, this idea has not been accepted by the Corporation, and the new bridge will simply modify to a relatively small extent the inconvenience of the existing structure.

The clear headway under the middle span will be reduced by 3 ft., the gradients brought down to a maximum of 1 in 30 on either side, the roadway increased from 29 ft. to 35 ft. in width, and the footpaths increased from 6 ft. 9 in. to 10 ft. wide each.

An undesirable feature of the new design is the substitution of five arches for the present series of three arches, thereby involving four instead of two piers in mid-river, where additional obstructions to navigation and the flow of water are clearly undesirable.

We understand that various architectural details, including the ornamentation of the piers and the design of the parapets still remain to be settled.

Sir Ernest George will act as consulting architect for the designs of the new bridge. The plans of Messrs. Basil Mott & Hay provide for a structure of five spans (between the present abutments), whereof the central span is 140 ft. 6 in. long, the two next adjacent 131 ft. 9 in. long, and the two at the ends 123 ft., giving a headway above Trinity high-water mark of 26 ft. at the middle, and a roadway with two footpaths, of which 6 ft. will be carried on cantilevers, as the width of the existing bridge within the abutments is but 42½ ft. The five spans will be of seven steel ribs from 3 ft. 3 in. to 3 ft. 6 in. deep in the centre, and from 1½ ft. to 5 ft. wide at the springing; spandrel posts at 4 ft. 7½ in. centres will carry the ribs for the flooring. The four new piers, to be encased in granite, will be 42 ft. in total height and 15 ft. wide for the two middle ones and 41 ft. high and 14 ft. wide for the two outer ones; they will rest upon steel caissons 100 ft. long, 29 ft. wide, and 13 ft. deep, sunk by compressed air, and filled with concrete. Sir William Arrol & Co.'s contract, for 278,148*l.*, includes the erection of two temporary steel bridges for foot traffic on either side of the present bridge, and the removal of the old piers and piling to a depth of 35 ft. below high water.

Sir John Rennie's bridge was built at a total

Boys' Secondary School, Hereford. (*See page* 773.)

Mr. G. H. Jack, Architect.

cost of some 800,000*l.*, and the ironwork, weighing 5,780 tons, was supplied by Messrs. Walker, of Rotherham. Joseph Gwilt laid out the approaches at both ends. In 1868 the Corporation bought the bridge for 200,000*l.*

SECONDARY SCHOOL FOR BOYS, HEREFORD.

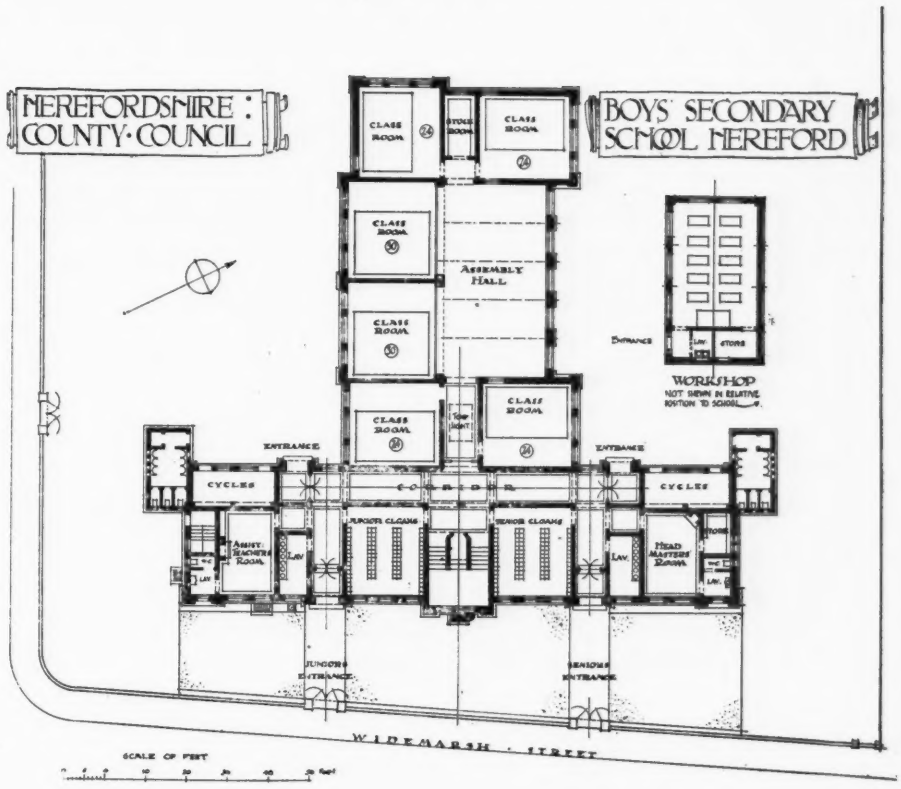
THIS building, which was recently opened by Sir James Rankin, Bart., is the largest school of the kind hitherto established in the county of Hereford. The principal façade, on Widemarsh-street, has two entrances, for senior and junior scholars respectively. The exterior is of local red brick with Bath stone facings, the roofs being covered with Old Delabole slates.

The accommodation on the ground floor includes a large assembly-hall, six classrooms, cloakrooms, and lavatories for senior and junior boys, head and assistant masters' rooms, cycle store, stock-room, and manual block. On the first floor are the laboratory, lecture-hall, preparation-room, art-room, dining-room, kitchen, and store-rooms.

The assembly-hall, 47 ft. long by 26 ft. wide, can be increased in size by opening the folding partitions between the hall and two large class-rooms. The building is warmed by low-pressure hot water, and ventilation is secured by means of hopper sash windows and extraction ducts in the roof.

The total cost, including land and furniture, was 10,200*l.*, the cost of the building alone having been 7,569*l.*, or 131*l.* below the architect's estimate.

Mr. G. H. Jack, the County Surveyor, was responsible for the design and construction of the building, which was erected by Messrs. E. W. Wilks & Son, of Hereford.



LONDON BUILDING LAW AND PROPERTY.

AT a meeting of the Auctioneers' and Estate Agents' Institute, held at No. 34, Russell-square, on Wednesday, December 18, a paper, entitled "The London Building Law and the Development of Property," was read by Mr. Horace Cubitt, A.R.I.B.A., P.A.S.I.

Development of Land for Building.

In the course of his remarks he said:—

"Let the development of land for building purposes be first considered. This form of enterprise is admittedly under rather a cloud, and probably comparatively little opening up of new estates is now being done in the London county area. But there is still a good deal of land in London that is available for building purposes, and it may be presumed that, when money is a little easier to obtain for land development, and when newer districts on the outskirts become more populated, the inner suburbs of London will receive the attention that they deserve.

If the average surveyor were asked off-hand to state the principal provisions of the law that govern the development of land for building purposes, he might possibly refer his questioner to the requirements of Part II. of the London Building Act, 1894, in regard to the formation of streets. He might also draw attention to sect. 105 of the Metropolis Management Act, 1855, in regard to the making up and paving of private streets. A few years ago no one could doubt the correctness of his answer, but it is now open to question whether the provisions of Part II. of the Housing and Town Planning Act, 1909, are not of more importance to a person developing a building estate than those of all other Acts of Parliament. It is open to any person developing an estate in London to apply to the County Council, which is the local authority for the metropolis, to approve a town-planning scheme.

There is a good deal to be said in favour of the adoption of this policy. If the stereotyped course is followed, and the plans for the formation of the streets are submitted under the Building Act, it is probable that, although the County Council have power to allow roads to be formed of any width they may think fit, it is improbable that they will consent to a less width, in the case of carriage traffic streets, than the standard width of 40 ft. Whereas, if a town-planning scheme is proposed, it may be reasonably expected that, recognising the public advantages to be gained by a lay-out of the land on model lines, the Council will be prepared to make very considerable concessions in regard to the width of the roads. Everyone who has developed an estate is aware of the very heavy cost entailed in forming roads of the standard width of 40 ft. Such width for subsidiary streets in a residential neighbourhood is quite unnecessary. A street 24 ft. wide will satisfy all traffic requirements, and if the houses are kept well back from the line of the road all considerations as to light and air space will be properly met. Of course, in a large estate some roads will require to be 40 ft. in width, possibly the width of one or two main avenues may be made as much as 50 ft. or 60 ft., but, nevertheless, it will be found that, in the aggregate, a very considerable reduction in area of road-surface will result.

In addition to the saving on the construction of roads, there is another very important advantage to be gained by the development of an estate under the Housing and Town Planning Act. It is a well-known fact that the supply of houses in London now much exceeds the demand, and the person who develops an estate without using his utmost endeavours to make his property more attractive than that in the immediate neighbourhood is making straight for the Bankrupty Court. There is an increasing tendency on the part of the modern householder to desire something better than the dead level of uniformity and dulness which is characteristic of most estates developed on the old lines. Not that it follows that the persons who laid out these estates were unwise in their own generation, although they have subsequently proved to be so. In their day the demand for houses if anything exceeded the supply, and it was to the obvious advantage of the owner of property to get as many houses as possible on his land. It was then hardly possible to anticipate the over-production in house property from which we are suffering to-day. It is, however, fortunate for us that most of the older estates have been so laid out that there is very little difficulty in surpassing them in general interest and attractiveness. A new estate laid out with a certain amount of irregularity in the lines of the streets—an irregularity which results naturally wherever undulating ground is encountered—and with a few open spaces, trees, shrubs, street flower-beds, etc., will make a greater appeal to the average prospective householder than one of straight streets and terrace houses all laid out on the old dull draughtboard plan. Not that the crank methods of street and house planning not infrequently met with in some recent garden suburbs need be in any way followed. When any new departure is made there is always a tendency to go to extremes, and the garden suburb movement has proved to be no exception to this general rule. There are ample opportunities for obtaining interesting effects without laying out streets of serpentine curvature, or planning buildings of which not one single room in a house is square.

It may be accepted as an axiom that no ordinary estate can be economically developed on modern lines unless it is possible to keep the width of the roads within reasonable limits.

Although the regulations governing the procedure of the County Council in regard to the making of town-planning schemes are rather involved, the course of action of owners of land who desire to develop their property under the Housing and Town Planning Act is quite simple. All that is necessary is for the persons concerned to submit an application, with plans, to the County Council. Presumably, it is possible for a single owner to approach the Council in this way, although from the wording of the Act it is apparently considered that, in the majority of cases, applications will be made by several owners acting together. It is worthy of notice that, if the County Council refuse to adopt a town-planning scheme proposed by owners of land, such owners may make representation to the Local Government Board, and the Board, after holding a public local inquiry, may, if it thinks fit, approve the scheme, which will then have effect as if it had been approved by the County Council.

Development of Land Already Built Upon.

Let the question of the development of land which is already built on be now considered. There are here two obvious ways of treatment:—(1) The demolition of the existing buildings, followed by the erection of buildings of a more remunerative character, and (2) the reconstruction and extension of the existing buildings in such a way that they, as far as may be possible, fulfil the purpose of new buildings. It appears that the former of these two courses is the one which finds most favour in Central London, and it will, therefore, be considered first. Usually a large building will require to be erected, and, in consequence, all the ordinary and some of the special requirements of the London building law will be found to be applicable. The provisions affecting the frontage line and distance back from the street will probably have a very important effect on the position and extent of the building. Speaking generally, it will be found that the London Building Act, 1894, safeguards existing interests, and it will be possible to build on all land which for the last twenty or thirty years has been occupied by buildings. Further, it will be possible in streets laid out before 1862 to build without restriction of height up to the ordinary 80-ft. limit, provided that the building is not being erected to house persons of the working class. But very often the whole of the site next the street has not been previously occupied by buildings, and it becomes a question to what extent, if any, it is permissible to extend the new building over previously unbuilt-on land.

There are two important provisions of the

London Building Act, 1894, which govern this point. Sect. 13 of the Act provides that no previously unbuilt-on land within the prescribed distance—20 ft. from the centre of the roadway in carriage traffic streets—may have a building erected on it or extended over it without the consent of the County Council. Sect. 22 provides that except with such consent no building may be erected on or extended over unbuilt-on land in advance of the general line of buildings.

The operation of sect. 13 is quite straightforward, and there should be little difficulty in determining whether or not a proposed building is affected by this section. The only point that requires watching is the determining of the centre of the roadway, for the definition of this term, as given in sect. 5 of the Act, will show that where a street has been widened the present centre of the roadway may not be the statutory centre. The extent of the operation of sect. 22 cannot in many cases be easily determined. The general line of buildings in a street is often a question of great uncertainty, and unless the position of the line is obvious it will be necessary to apply to the Superintending Architect for a certificate defining the line. If this certificate operates unfavourably in regard to the proposed building, it may be well to exercise the right of appeal to the Tribunal of Appeal.

The provisions as to open space which apply in the case of all domestic buildings, other than office buildings, were originally thought to operate rather unfavourably in the way of the development of property. Increased familiarity with these requirements has, however, reconciled most people to them. Generally speaking, it may be said that if these requirements are thoroughly understood—which is admittedly no easy matter—it will usually be possible to arrange a new building in such a way that the law is complied with, and, at the same time, no very great sacrifice of accommodation is involved. It is worthy of notice that in the case of sites of irregular shape it is possible to apply to the Council to allow some deviations from the ordinary requirements, and in all cases it is possible to take advantage of the provisions regarding "equivalent air space," whereby it is permissible to extend a portion of the rear of the building beyond the diagonal line when such line is drawn from ground level, provided that an equivalent amount of cubic space is elsewhere left unbuilt on.

Prior to 1908 the power of the Council to allow divisions in large warehouse buildings to exceed the ordinary limit of 250,000 cubic ft. was restricted to a maximum limit of 450,000 cubic ft. By the London County Council General Powers Act of 1908 the Council obtained the right to exercise unlimited discretion in regard to this matter, and an obstacle in the way of the erection of buildings with the large open floor areas required in certain trades was thereby removed. The decision as to the allowance of increased cubic extent rests, however, entirely with the Council. There is no appeal in this matter from their decision, and it may be assumed that great increases in cubical extent will not be granted except subject to conditions, such as the provision of automatic sprinklers and the encasing of the structural steelwork, which will tend to prevent the growth of a big fire. This is only reasonable, and is in the interest of the owner of the property as well as that of the general public. We do not want to have the fire risks that are current in the United States, where our methods of subdividing large warehouse buildings are apparently almost unknown.

As regards the question of general construction, although it is not yet permissible to erect buildings with enclosing walls of reinforced concrete, the London County Council General Powers Act, 1909, has legalised steel-frame construction. But, except in the case of very large buildings, it will generally be found cheaper to build ordinary brick walls or piers than to provide a system of steel stanchions.

Less Drastic Method of Developing a Site.

The time has now come to deal with the less drastic method of developing a site on which buildings are already erected. There is a very great deal to be said, in the majority of cases, in favour of adopting the policy of altering and remodelling the existing premises instead of razing them to the ground and starting with a cleared site. Admittedly from the standpoint of efficiency, untrammelled by financial considerations, the more drastic policy is to be recommended. But the financial element is usually predominant, and in a very large number of cases it will be found, if both sides of the question are fairly considered, that a scheme of remodelling and extending existing premises will show a very much better percentage on the sum expended than a scheme which involves the clearing of the site and the erection of new buildings. A very large portion of Central London was erected during the XVIIIth century, when it was the custom to design on liberal lines, with big rooms, and spacious halls and staircases, all decorated throughout in excellent taste. Numbers of fine Georgian buildings may be met with in the inner districts of London. Their demolition is open to objection on several grounds. From the artistic standpoint it is an act of vandalism. From the practical point of view it is bad business. The fine airy rooms met with in Georgian buildings are becoming to be more and more appreciated by the general public, and could not be built to-day at less than from 1s. 6d. to 2s. per cubic foot. The obvious way in which to deal with a building of this type is to remodel it, retaining the principal main rooms, and adding new sanitary arrangements and any additional accommodation that may be required. By this method not only a cheaper but a better building will in many cases be obtained than if the site were cleared and a new building erected. But work of this kind requires the skill of a trained architect even more than that of constructing a new building. It is quite a mistake to consider that because any proposed works are in the nature of alterations they can therefore be quite very well designed by an enterprising youth in the office who happens to have a little ability as a draughtsman. The work of remodelling an old building is more difficult than that of designing a new one, and even small alterations are worthy of more skilled attention than they usually receive.

Now as to the effect of the provisions of the London building law on any works of alterations and remodelling. Stowed away in an unlooked-for place in the 1894 Building Act is a section which is of vital importance in regard to such works. It is provided in sect. 207 of the Act that "it shall not be lawful (unless with the consent of the Council) to make any alteration of any building in such manner that when so altered it will by reason of such alteration not be in conformity with the provisions of this Act applicable to new buildings." The most important parts of the section are the words "unless with the consent of the Council." It follows that, with the consent of the Council, any form of construction or arrangement may be adopted, and the Council frequently exercise their powers under this section, and allow deviations from the ordinary requirements of the Building Act. Whenever in works of alteration some requirement is encountered which seems rather difficult to comply with, an attempt should be made to look at the case from an impartial standpoint. If when thus viewed, no grave disadvantage will appear to result from a relaxation of the requirement in question, the Council may with advantage be approached. The application should not, however, be, as it were, slung at the heads of the officials of such body, but the reasons which make the requirement unsuitable in the case in question should be consisely explained, and everything possible should be done to induce the Council to see the matter from the standpoint of the applicant.

As regards the provision of additional accommodation, the extension of a building can, of course, take place in two directions—horizontally and vertically. Horizontal extension in the direction of the street will often be barred by the "prescribed distance" or "general line" provisions of the 1894 Building Act. Horizontal extension in the rear is usually a much more feasible proposition. Very often the property in the rear of a building is of a comparatively low class, and can be acquired cheaply. In the case of a domestic building, for which an open space at rear is required, it is a great advantage, where possible, to extend the building through to a street in the rear. Then this rear street will itself constitute the required open space, and the diagonal line, which limits the height of the rear portion of the building, may be drawn from the centre of such street, either at the level of the surface of the roadway of that street, or 16 ft. above the level of the pavement of the front street, according to the age of such front street.

The obvious difficulty in extending a building vertically is the probable insufficient thickness of the walls for any such increase in height. And it must not be thought that the question may be dodged by putting a story or stories in the roof, for in London the statutory height of a wall, on which the required thickness to some extent depends, is from the base of the wall to the top of the topmost story. But sometimes two of the walls are thicker than the others, or there may be some strong piers suitably disposed, in either of which cases it may be possible, by means of girders, to arrange that the weight of the new story or stories will come upon a portion of the structure which is well able to bear it. Or possibly in an exceptional case it may be desirable to erect steel stanchions or reinforced concrete pillars from the foundations upwards in order to support the new load. None of these contrivances will, of course, obviate the technical objection as to the walls being of insufficient thickness. But if a sound scheme of practical construction is devised the Council may then be approached with a view to obtaining their consent under sect. 207 of the 1894 Building Act."

THE ARCHITECTURAL ASSOCIATION CAMERA, SKETCH, AND DEBATE CLUB:

INTERNAL DECORATION.

On the 12th inst. (Ladies' Night) a meeting of the Architectural Association Camera, Sketch, and Debate Club was held, when Miss Cohen read a paper on "Internal Decoration," Mr. P. H. Adams, Chairman, presiding.

Miss Cohen divided her paper into two parts—the first, attacks on the architect, and the second, attacks on public taste. She made these attacks because the house-decorator suffered by the misunderstanding and the mistakes both of the architects and of the public, and sometimes felt a little bitter about it. The decorator worked under a double limitation. There was the limitation which he and the architect had in common: each worked for a client. That was to say, each had the double duty of directing the taste of the client while satisfying it. But the architect was less restricted in this than the decorator, who worked on that part of the house with which the client lived most closely, about which he thought that he had a right to know something, and on which he would probably have fixed ideas, so that the house-decorator, in a stricter sense than the architect, worked solely to please other people. She did not, of course, mean by this that he must abandon his own taste and his own knowledge to the ignorance or false ideas of somebody else; but that, however beautiful he may make the interior of a house in itself, he had failed unless he had made his client feel that it was beautiful. Again, the house-decorator was rarely so fortunate as to work with an empty house. There would usually be furniture and pictures from a previous house which had to be fitted into the scheme. He might perhaps find a beautiful picture up to which he could decorate; on the other hand, it was more probable that he would have thrust on him ugly pieces of furniture which would tax his ingenuity to hide away. These were difficulties which the architect did not share.

But suppose that the house-decorator had the freest hand which, in the nature of things, is possible. He still had to work with the material which had already received the impression of another mind; he must take the room with the shape, the proportions, and the woodwork as it left the architect. He was limited by the architect's ideas and often hampered by his mistakes. She had seen rooms spoiled, even before the decorator entered them, by ill-designed mouldings, heavy mantelpieces, and ornate cornices. It was rare to find a mantelpiece that was well designed. The modern mantelpiece was often heavy in design and crowded with ornament. The decorator might, it was true, correct some mistakes if he did not like a room's proportions; and many a time had she had to do it.

It was a generation since house-decorating began to be practised seriously. It was now recognised as one of the professions; it was even accepted as an art in itself. But it had still to be accepted as a high and serious art, that was, which required long and careful study. Decorating would not be taken seriously by the public as long as architects took it lightly.

Let them consider two of the most important parts of decorating—the designing of woodwork and the choice of colours. She did not believe that to either did the majority of architects

give proper study. She had come across much woodwork in modern houses that was ill done; it was of poor design in itself, and it was even badly placed in the room. Nor had she formed this opinion of the neglect of woodwork only from her own experience, but from the confession of architects themselves. On the question of paint she would call one witness. She complained to the head of a large wallpaper manufacturers of the vicious fashion for white paint. One would see hundreds of houses which had all their woodwork painted a glaring white, altogether out of harmony with the other colours. She was told it was an architect's fashion; that architects chose white as an easy way out of the difficulty of matching and shading colours, because white might be thought to go passably well with any paper. She had read in the *Builder* a paper on "The Decorating of a Small House," by Mr. Arthur Seymour Jennings,* Fellow of the Institute of British Decorators, which contained some pertinent criticisms. But there was a suggestion in it on this subject of paint with which she strongly disagreed, and she mentioned it because it seemed to be another example of the errors which come from taking the business of decorating too lightly. The suggestion was that the Institute should offer, for a small fee, to give professional advice; that it should send one of its members to any tenant who desired such advice, and that he should select papers and paints on the spot and leave a "cut-and-dried" plan of decoration to be carried out by the local house-painter. "Half-day or a little more," Mr. Jennings said, "would be amply sufficient time in which to do such work." This sounded very simple, but there was one objection to it—it was not possible to leave a "cut-and-dried" scheme for a house-painter to carry out. The average house-painter could not be trusted to match colours; he had not the necessary knowledge of colours nor the necessary taste. These things were not easily acquired.

Proceeding, the lecturer said:—

"I should like now to say something of those errors in public taste of which I have had experience. Some, like the white paint fallacy, come from taking house-decorating lightly; but the majority can, I think, best be described as errors against simplicity; they are, too, errors of ignorance. That is to say, if it were understood what the house-decorator desires to do and the principles on which he works, many of them would disappear. There are fewer people than is commonly believed with a natural delight in what is vulgar and pretentious. Most, I think, are very ready to admire what is simple and beautiful if they are taught. To understand the aim of the decorator, you must remember that he is picking up a broken tradition. Modern house-decorating was part of the movement of the fifties, which was a protest against the utilitarian ugliness of the two preceding decades—a desire for beautiful things. The utilitarian theory can be seen plainly in all the furniture and decorating of the Early Victorian period. The furniture of that period is ugly, because it is very solid and heavy. It was designed for use, and where ornament was desired it was made a separate thing. It was made not as part of, not even to harmonise with the thing of use, but as a contrast. That was the inevitable result of assuming that a useful thing need only be useful; and so we have side by side with the solid and sombre furniture of the Early Victorian time strange and fantastic ornaments and highly-coloured wax fruits, the extreme of simplicity in design for the useful thing, and the extreme of violence in colour for the ornamental thing. . . .

It is clear, then, that the modern house-decorator, in taking up the broken tradition, has to go back a full century to the Georgian period, and through that to the Queen Anne and Jacobean periods. This is no retrograde movement, for it is towards the most modern period of good English decorative art. It is to take up the tradition where it was broken off.

Even less is this movement purely imitative. The decorator can, of course, deal in mere copies of the designs of others, and much work of the sort is done. You will find many copies both of the furniture and the decorations of the XVIIth and XVIIIth century artists. There are even many fraudulent copies of the best modern wallpapers done with small mechanical alterations of the designs to avoid infringement of copyright. It is not for this reason that the chief part and the most delightful part of a decorator's training is the study of the fine woodwork furniture and designs of the XVIIIth century, but because, like other artists, he must get an instinct for beauty and a standard of beauty by steeping himself in beautiful things, and because he has in the XVIIIth-century work a fine English tradition of decorating in a simple and dignified style, which he must attempt to carry on in the difference circumstances of modern life. In taking up this tradition he is taking up aristocratic ideas, the ideas of great town and country houses, and he uses them and modifies them for middle-class life, to suit smaller houses, and a different manner of living, and an age which, even in its art, depends a very great deal on machinery.

That is the central principle of modern house-decorating—to apply aristocratic ideas to fit middle-class life. I believe that the decorator must study and study, and continually study the fine things of the Georgian, Queen Anne, and Jacobean periods, not only because they are good or because they are English, but because they are good in the right way for us, in a way in which the contemporary French decorative work was not good. They are good in a simpler way; their chief beauty is their perfect proportions. It is for that reason that they are sound models for modern decorators. They are aristocratic, but because of their simplicity they can be adapted to middle-class houses and an easier and less elaborate ceremony of life.

If we keep this aim and idea clear the common faults of taste become at once impossible, because they become at once apparent. The most numerous and most serious faults are, first of all, the many faults which come under the head of imitations. Chief of these is the fault of decorating in set styles; it reduces decorating to a very mean and mechanical business, and the decorator to a mere copyist, but it is encouraged and much practised by the large furnishing firms. And so you will get houses furnished Louis Quatorze or Louis Seize or Queen Anne, without any regard to the fitness of the style, to the size or the shape of the rooms or their uses or the manner of life of their inhabitants. You may even get each room of a house furnished in a separate style. . . .

This is catholicity of taste run mad. It breaks, violently breaks, the first and elementary rule, that all the rooms of a house, like all the things in one room, should show no violent contrast with one another, but be a harmonious whole. . . .

I do not want it to be thought that any English decorator can be altogether indifferent to the ideas or independent of the products of other countries: we get many beautiful things from abroad. No longer ago than in my predecessor's time we had silk woven in Spitalfields, but that industry has disappeared, and for silks we have now to go to France; for velvets we go to Germany; and we get many new and fine stuffs, beautiful wall-coverings made of grass fibres, for example, from Japan.

There are many other forms of imitation no less vicious than the copying of set styles; there is the imitation of Nature. Many impatient people are not content that a pattern should be a pattern and no more than a pattern. They are not satisfied with a conventional rose design; they want the illusion of a rose itself. They do not understand that a wallpaper covers a flat surface, and that if a design is so realistic that it seems to stand out from it, if the flowers on it offer themselves to be picked, then the paper suggests something which it is not."

In speaking of the Art Nouveau, the lecturer said:—"Its disciples are as wrong in their ideas as were the Early Victorians. They, too, believe that use and beauty cannot go together; but their products are even worse. The utilitarians did, at least, produce useful things; but the things of the Art Nouveau are neither useful nor beautiful. Use is sacrificed for the sake of a beauty which is not achieved. Art Nouveau throws aside all restraint in its designs, but its central idea is a grotesque shame. It is ashamed when a chair looks like a chair; it prefers that it should look like the trunk of a tree. It attempts to disguise everything. It makes balusters like twisted serpents and electric lights like horseshoes on an anvil; it makes everything appear like something else. These imitations are bad enough, but there are others which are still more gross—imitations which attempt to give simply an illusion of costliness. . . .

The manufacturer finds it better business continually to produce new designs, even if they are bad, and continually to encourage the public taste in novelty. Things that are made to satisfy such a standard cannot have, and are not intended to have, any durable worth.

Now all these errors of taste, imitations, and so forth, offend against that principal thing at which a decorator must aim—tranquillity. They are all restless. To be continually struck by the newness and strangeness of a piece of furniture, or to be continually reminded that a design is not what it seems, to look at marble and then remember that it is painted iron—all this is not to feel at home. In a home you aim at something different, at ease and familiarity, and so the things in it must have a lasting worth; they must satisfy more than a momentary fancy; they must be companionable."

Mr. Bullock, in proposing a vote of thanks said he did not agree with the remarks as to imitating old works. He himself had had to do so, and it becomes a necessity in restoration or when a client demands a copy of some old room. He hoped that wallpapers would be abolished.

Miss Fuller seconded the vote of thanks.

Mr. A. H. Belcher said that he had hoped to have heard more of Miss Cohen's methods, and did not agree with all the accusations she had levelled at the heads of architects. Whilst holding no brief for the imitations of mouldings on a flat surface, he instanced a church at Edgware where this method was followed with a pleasing effect. He also was of the opinion that the use of wallpaper was often an abuse.

Dr. Helen Boyle agreed that the house-decorator should educate the public taste. The house-decorator, in her opinion, should not pay too much attention to the client's wishes and should take justifiable risks.

Mr. C. G. Boutcher said that the less decoration used the better for the building. He was of the opinion that good architecture should rely on form and proportions for its effect. He suggested that Miss Cohen's criticisms should be turned rather against the speculative builder than against the responsible architect.

Mr. Bart Tunnard said that he did not agree with Mr. Bullock's justification of reproducing verbatim old rooms. He held that these tended to vulgarise the original. As to the Nouveau Art movement, he did not hold the opinion that we lacked able craftsmen, and instanced some of the furniture shown at the recent Arts and Crafts Exhibition. He said that we were living in an age of our own, and that while the past could not be neglected, it was a mistake to reproduce old work and fit it to modern requirements.

Messrs. Rogers and Allcorn also spoke.

The Chairman, in putting the vote of thanks to the meeting, said that the business of the decorator was to divert the public from the standard of taste thrust at it by the wholesale manufacturer, and remarked that we lived in an age of selection rather than of initiative.

The motion being carried, Miss Cohen replied, and the meeting terminated.

THE LAND INQUIRY.

QUESTIONS were recently put to the Government in both Houses of Parliament relative to the informal inquiry into the tenure of land. The Lord Chancellor, in reply to Lord Halsbury, is reported as having said:—"The inquiry was being made by Mr. Lloyd George. No Minister could divest himself of his official capacity, but, so far as it could be done, the inquiry was unofficial." The Lord Chancellor also said that he had not the least idea who was finding the money. Lord Lansdowne drew attention to the speech delivered by the Chancellor of the Exchequer at Aberdeen in which he was reported to have said he must "burst up" the land system, thereby apparently anticipating the results of the inquiry for which he is responsible. In the House of Commons Mr. Asquith said that no person engaged in the inquiry had any right to profess to be acting on behalf of the Government

It may seem open to question Lord Haldane's statement that no Minister can divest himself of his official capacity in the light of the utterances of the Chancellor of the Exchequer. A Minister who is responsible for the annual Budget, according to all precedent, observes a strict reserve beforehand as to his views.

In his Aberdeen speech Mr. Lloyd George said he was accused of undermining credit and ruining trade, especially in connexion with the

* See our issue for November 29, page 651.

Finance Act, 1909-10, but that trade had gone on improving ever since. The Chancellor of the Exchequer has been fortunate in that there has been a cycle of prosperity in the general trade of the country during the past three years which has to some extent mitigated the influences of his 1909 Budget.

With secret inquiries pending and popular promises constantly made in reference to the land, what is the position of those who are seeking to develop land, and those societies, such as building societies, land societies, etc., who have the savings of needy classes invested in land? Is it fair play constantly to depreciate vaguely their securities?

TRADE UNIONS, 1911.

THE *Board of Trade Labour Gazette* in August last published some interesting statistics relating to the membership of all trade unions in the United Kingdom, upon which we commented in our issue of August 30. In the current number of the *Gazette* there is an article on the membership, income, expenditure, and funds of 100 principal unions for the year 1911. The 100 unions have a membership representing 60 per cent. of the membership of all unions. The years 1907-8-9 showed comparatively small fluctuations in membership, but in 1911 it increased by 347,186, and they now total 1,816,506. The total income is the highest recorded, and amounted to 2,936,754*l*. In the article it is stated that this is due to the increased membership, but that from the same cause both the amount of income per member and the expenditure per member is less than in any of the preceding ten years.

The total funds increased by 434,573*l*., and the amount of 5,570,690*l*. has only been exceeded in 1907; but in that year they represented 77s. per head, whereas in 1911 the amount was 61s. 4d. per member. The summary of the expenditure during the past ten years is very interesting and instructive. During the ten years the 100 unions have expended 22,946,000*l*., and of this sum 6,140,000*l*. went in unemployed benefit, 9,543,000*l*. was sick, accident, superannuation, and other benefit, and only 2,455,000*l*., or 10·7 per cent., of the total amount was expended on dispute pay. Working expenses and miscellaneous items accounted for 4,808,000*l*. We quote these figures because at the present time they seem peculiarly important. Trade unionists are under the impression that a large section of the community is antagonistic nowadays to the unions. This is solely due to the discussion that has been evoked by their seeking political powers and the possible use by the unions of their highly-privileged position under the Trade Disputes Act in their proposed new political sphere. We have always recognised the efficiency and value of trade unions as benefit societies and, in many respects, as trade societies, and the future of trade unions rests largely in their own hands. In their capacity of trade societies on purely trade questions discipline should be maintained, so that their important function of collective bargaining may be exercised. Strikes without notice, contrary to trade union rules, should be vigorously repressed by the union leaders, and agreements when entered into should be adhered to. The strike, and especially the sympathetic strike, should be sparingly used, and never to intimidate the public. On the other hand, political action should be confined to matters connected with trade and employment; general politics should be avoided, and any kind of political duress or compulsion be prohibited by the unions. We venture to submit that if the unions proceed on such lines they have a great future before them.

THE WONDER OF WORK.

THOSE who went to the Royal Society of Arts on the evening of December 18 had no reason to regret their pilgrimage to the Adelphi, for Mr. Joseph Pennell gave a lecture on "The Pictorial Possibilities of Work" which will be remembered by the audience for a long time; and the lithographs and etchings on the walls, with the lantern views, were as instructive and as attractive as could be desired.

The origin of the lecture was Mr. Pennell's visit to the Panama Canal, but the opportunity was taken to look back on the artistic achievements of the past.

Among the artists chosen by Mr. Pennell to illustrate his subject were Rembrandt, Claude, Canaletto, Piranesi, Turner, Whistler Meunier, Ford Madox Brown, Puvis de Chavannes, Menzel, Mr. W. L. Wyllie, Mr. D. Y. Cameron, Mr. Muirhead Bone, Mr. John Lavery, and Mr. Frank Brangwyn. Several of Whistler's etchings were thrown on the screen, with the picture "The Building of New Westminster Bridge," painted in 1862, which was a feature of the Memorial Exhibition of the artist's works held at the New Gallery in 1905.

In the course of his remarks Mr. Pennell said:—

"I went to Panama because I believed that, in the making of the greatest work of modern time, I should find the greatest inspiration. The day I landed in Colon I found it. I had seen great cranes at Pittsburg and Duisberg, but nothing like that which stretched its great arm, with great claws, over the sad, silent swamp of Mount Hope—the *détâ·le* of De Lesseps' ambition. I had seen in New York, as I sat on the thirtieth story of the Metropolitan Building, a chain come up from below with a man clinging to it. But I had never imagined anything like the group of figures which rose out of Gatun Lock at dinner-time. I had looked into chasms and gulfs, but I never imagined anything so terrific as the gates of Pedro Miguel. I had seen the greatest walls of the oldest cities, but I never imagined anything so imposing as the walls of Miraflores Lock. I had seen the great aqueducts and great arches of the world, but I never imagined anything like the approaches to Gatun and the spring of Pedro Miguel, made by army officers and civil engineers mainly to save material. For there are no architects, no designers, no decorators on the Panama Canal—just engineers and organisers—Goethals, Gaillard, Gorgas, Williamson, Bishop, and more. But the engineers at Panama are great designers, and great work is great decoration.

"Work to-day is the greatest thing in the world, and the artist who best records it will be best remembered. In France, Germany, and Italy the Wonder of Work around us has been made the subject of endless commissions from the State to artists. But records of facts, facts of one's own time, here and in America are never recorded. Go to the Royal Exchange and you will find Wat Tyler, Phœnicians, prehistoric apple-carts, and everything in the history of London that can be made into a painting of the past, and not a single record of the present. Where is the building of the Tower Bridge, the electric light works, the docks, the Blackwall Tunnel, the trams, the Tube, or any of the other works by which this age, this workaday age, has distinguished itself, all of which are worth painting? John Lavery has made, in Glasgow, a decoration out of shipbuilding which is worth the whole wall coverings of the Royal Exchange and the House of Lords put together."

GENERAL NEWS.

Professional Announcement.

After Christmas the offices of Messrs. F. H. Greenaway & J. E. Newberry, architects, will be removed to Parliament Mansions, Victoria-street, Westminster.

Appointment: Calcutta Cathedral.

Mr. Heathcote D. Statham, Mus.Bac., Cantab., eldest son of Mr. H. Heathcote Statham, F.R.I.B.A., has been appointed organist of Calcutta Cathedral.

Cambridge University.

The following four candidates have passed the examination in Preliminary Architectural Studies at Cambridge:—Part II.—Class I.: P. H. Pilditch (Pemb.). Class II. (in alphabetical order): K. M. B. Cross (Caius), D. C. Parsons (Trin.). Class III.: E. N. Clifton (Trin.).

Crystal Palace Engineering School.

The "Wilson Premium" for the best paper read before the Crystal Palace Engineering Society (affiliated to the Society of Engineers Incorporated) during the present session has been awarded by the Council to Mr. J. R. M. Chalon for his paper on "Wireless Telegraphy." Other papers read during the session were:—"The South-Eastern Coalfield," by Mr. B. L. Rigden; "Compressed Air," by Mr. H. M. Jordan; and "Reconstruction of Komati Poort Bridge," by Mr. J. E. Thomas. The premium was presented to Mr. Chalon by Mr. R. Elliott-Cooper, President of the Institution of Civil Engineers, on the occasion of the 120th distribution of certificates of the School, on the 19th inst., at which he presided.

Coronation of George V. Tapestry.

Messrs. Morris & Co. are weaving at their Merton Abbey Works a large piece of commemorative tapestry whereof the design reproduces that of Mr. Bernard Partridge's "Arming of the King" in the Coronation number of *Punch*; Mr. Partridge has made a coloured replica of his cartoon for use at the loom. The woven piece will be enriched with a wide border of trailed York and Lancaster roses interlaced with badges of the reigning houses during the past seven centuries, from designs by the Rev. E. Dorling, who devised the heraldry for the King's Coronation and the Prince of Wales's Investiture at Caernarvon Castle. A scroll at the top is inscribed, "Georgius V. Rex et Imperator armis induitur A.D. X. Kal. Jul. MCMXI."

Property Sales.

The late Sir L. Alma Tadema's house in Grove End-road, St. John's Wood, upon which he expended some 70,000*l*., was withdrawn from sale after a bid of 30,000*l*.; negotiations are in progress for buying the house and grounds as the headquarters of a learned and artistic society.—Avonholm, Glassford, Lanarkshire, designed by Robert Adam, has just been sold to Mr. R. Halket, of Glasgow.—Swinton House, Berwickshire, just purchased by Captain G. H. Tayler Swinton, of Upminster Hall, Romford, has vested in that family (until a few years ago) since the XIth century, and there is record of Luilf, of Bamburgh and Swinton, Shire-reeve of Northumbria, as being the first individual Scottish subject whose ownership of land can be proved by contemporary and extant documents.—Messrs. Collins & Collins have sold No. 2, Carlton House-terrace, St. James's, for nearly 100,000*l*; the house was the residence of Lord Liverpool, and latterly of Mrs. Maldwin Drummond.—The Island, Waterford, with the Castle (the home of Edward Fitzgerald), built by the Fitzgeralds in the XIIth-XIIIth centuries, will be offered for sale, with the works of art and fine old furniture, in the coming season, together with Quenby Hall, near Leicester, a fine example of domestic Jacobean architecture (1610-20), constructed of brick, with the diamond pattern, and having Ketton stone dressings.—Sir Sothern Holland has bought Westwell Manor, Oxon, near Burford, a typical Cotswold house, of stone, and with a stone slab-roof, *temp.* James I.

Art Sales.

The first part of the sale at the Manzi-Joyant Gallery, Paris, on December 9-11, of the late M. Henri Rouart's collection of old and modern pictures realised 186,274*l*. The collection comprised forty pictures by Corot and fourteen by J. F. Millet, and numerous drawings by them, with examples of Degas, Manet, Fantin-Latour, Troyon, Cezanne, Diaz, Monet, Renoir, Henri Daumier, the caricaturist, and many other modern painters. The lots included Corot's "La Source" (1,480*l*.) and "Villa d'Este à Tivoli" (4,440*l*.)—these were bought for 14*l*. and 160*l*. respectively at the artist's sale in 1875—and his "Les Baigneuses aux Iles Borromées" (8,400*l*.—Knoedler); "Femme en Bleu" (6,480*l*.—Louvre Museum); and "Naples et le Château de l'Œuf" (1,180*l*.); Degas's "Les Danseuses à la Barre," 2 ft. 6 in. by 2 ft. 7 in., depicting two ballet-girls at practise, originally sold for 20*l*. (17,400*l*.); "La Répétition de Danse" (6,000*l*.—Knoedler); "Sur la Plage" (3,600*l*.—Sir Hugh Lane); and "L'Enlèvement des Sabines," after Poussin (2,200*l*.); Manet's "Buste de Femme Nue" (3,880*l*.); "La Leçon de Musique" (4,800*l*.); and "Sur la Plage" (3,680*l*.); Puvis de Chavannes's "L'Espérance" (2,600*l*.—the Luxembourg Museum); Goya's "Femme Espagnole" (5,680*l*.—Sir Hugh Lane); Fragonard's "Paysage" (2,800*l*.) and "Repos Pendant la Fuite en Egypte" (3,000*l*.). At Christie's was sold for high prices last week some old English silver, the property of Captain J. H. Reynolds, Mr. J. H. H. V. Lane, and others. The lots comprised a James I. silver-gilt steeple cup and cover, embossed and chased. 13½ in. high (1621), nearly 11 oz. in weight (80*l*.—Crichton); a William and Mary monteith, 11½ in. high, at 205s. (50*l*.—Crichton); an Elizabethan chalice and paten (1571), 9 in. high, at 400s. (268*l*.—Elkington); a James I. beaker, richly engraved, 6½ in. high

(1607), at 640s. (243*l.* 4s.—Elkington); and a clock-watch by Edward East, London, XVIIth century (147*l.*—Huggins); with an Irish potatoring, Dublin, of about 1670, at 1670, at 450s. (216*l.*—Permann).

Church Building Society.

The Incorporated Church Building Society held its usual monthly meeting on the 19th inst., at the Society's House, 7, Dean's-yard, Westminster Abbey, S.W., the Hon. Sir E. P. Thesiger, K.C.B., in the Chair. Grants of money were made in aid of the following objects, viz.:—Rebuilding the Church of St. Mary Magdalene, Stowell, Somerset, 60*l.*; and towards enlarging and otherwise improving the accommodation in the churches at Dymchurch, St. Peter and St. Paul, Kent, 40*l.*; and Pleasley Hill, St. Barnabas, Notts, 50*l.* The following grants were also paid for works completed:—King Cross, St. Paul, Halifax, 250*l.*; Langley Mill, St. Andrew, Derbyshire, 150*l.*; Taplow, St. Nicholas, Bucks, 150*l.*; Colne, Holy Trinity, Lancs, 120*l.*; Headstone, St. George, Middlesex, 100*l.*; Gringley-on-the-Hill, St. Peter and St. Paul, Doncaster, 50*l.*; East Wickham, St. Michael, Welling, Kent, 50*l.*; Fitzroy-square, St. John, Middlesex, 40*l.*; Hendon, St. Paul, Sunderland, 30*l.*; and Rathmell, Holy Trinity, Yorks, 10*l.* In addition to this the sum of 100*l.* was paid towards the repairs of five churches from trust funds held by the Society.

City Subway, Cannon-street.

The Corporation of the City have placed with Messrs. Mitchell Brothers, Ltd., of Victoria-street, S.W., a contract for the construction, after designs by Messrs. Basil Mott & Hay, MM.Inst.C.E., of the subway at the junction of Queen Victoria and Cannon streets. The subway, having a total length of 280 ft., a width of 10 ft., and height of 8 ft., will be planned in the form of a cross, with entrances from the two streets and from beneath Mansion House railway-station. It will be made under timber road-decking, on the "cut-and-cover" system, with brick walls, concrete floor, and steel trough roof; a subway, 12 ft. wide, for mains and lines of various kinds must be lowered at Queen Victoria-street, and other mains and sewers, one of them 4 ft. high, will be diverted horizontally.

Art and Industry.

Mr. Frank Warner, President of the Silk Association of Great Britain and Ireland, recently distributed the prizes at the Macclesfield School of Art. In an address on "Art and Industry" he said that those in control of our educational system seemed bent on stifling all effort, thwarting every scheme, and humiliating to the dust all those who had the temerity to attempt to attach to our industries that touch of art culture of which they stood to-day in such need. They had forced upon them a scheme of examinations which was more academic, extreme, unnecessary, and impossible than anything ever attempted before. The new regulations for examination in industrial design would result in a fiasco, for the simple reason that no industrial student, certainly not one connected with the textile industry, stood a chance of passing unless he studied far beyond the range of subjects that was necessary for his efficiency as a designer. A still more serious upheaval was the threatened abolition of the National Competition hitherto held at South Kensington. The competition had done a great good, not only in stimulating the students, but to the art schools themselves.

BOOKS.

Pitman's Law of Repairs and Dilapidations. By T. Cato Worsfold, M.A., LL.D. (London: Sir Isaac Pitman & Sons, Ltd. Pages xii. and 91. Price 3s. 6d. net.)

This is a very useful little book written in a style which is both clear and concise. The branch of the law with which it deals necessarily affects in some degree persons of all classes either as landlords or as tenants. Many a man at some time or other has found himself in a difficulty and has been perplexed as to what he is or is not liable for as a landlord or as a tenant, and further to what extent in either capacity.

That being so, there was indeed room for a handy book upon this intricate subject, seeing that most of the standard text-books upon it are too detailed and bulky for use by anyone but a trained lawyer. The author has succeeded in producing a very readable work which sets out in admirable fashion not only the principles embodied in statutes, but also the manifold legal decisions arising therefrom, and the book is quite up to date, for it includes decisions right down to July 31 of this year, which was the last day the courts sat prior to the long vacation. The author is certainly to be congratulated upon having fulfilled the difficult task of compressing into a small compass a very complex branch of our law, while at the same time retaining sufficient details to render his work of service to lawyers as well as to laymen.

The Table of Cases would perhaps have been more useful to the former if full references had there been given against the names of the cases, and it is also customary to enclose dates of cases in square brackets when such dates actually form part of the reference, but these are small matters which in no way detract from the general merit of the work. There is a Table of Statutes and an index.

Water Supply and Drainage Systematised and Simplified. By C. E. Housden. With three plates. (London: Longmans, Green, & Co. 1912. Pages 28. 1s. 6d.)

This small volume is a supplement to the author's "The Precise Calculation of Pipe Drain and Sewer Dimensions," but it can be used without reference thereto. It explains in detail the method of determining the sizes of main pipes in a system of water supply, including the investigation of velocities of flow in the pipes and the reduction of excessive pressure, together with the allowances to be made for eventual incrustation. A drainage project is dealt with upon parallel lines.

The outstanding features of the book are two scales for ascertaining the dimensions of pipes and sewers, adopting any desired co-efficient for the state of comparative roughness of the wetted surface. These should be very useful in rapidly arriving at and in checking sizes of pipes.

The Mechanical World Pocket Diary and Year-Book for 1913. A Collection of Useful Engineering Notes, Rules, Tables, and Data. (London: Emmott & Co.; and Tokyo, Osaka & Kyoto: The Maruzen-Kabushiki-Kaisha. Pages 439. 6d. net.)

This issue is in no way inferior to its predecessors, and has some excellent points. We notice, for instance, the clear way in which terms of the class that "every schoolboy knows" are defined; anyone who is often asked for such definitions by beginners knows how difficult it is to lay hands on a small book which will give them clearly; in the present work we find an excellent series under the headings of "Steam and the Steam Engine," "Notes on Heat," "Beams and Girders," and elsewhere.

In addition to the chapter on steam engines of more ordinary types there is an article devoted entirely to steam turbines. The means of production of steam are dealt with in sections on boilers, their design and setting, and the corrosion and incrustation met with in them. The design of the chimney and notes on superheating of steam are added. Gas-producers and gas and oil engines are also treated of, and there are copious notes upon shafting, gearing, belting, hemp and wire rope driving, chain driving, ball and other bearings, and many useful tables and workshop notes.

The appearance of the name of a Japanese joint stock company as joint publishers of a handbook of this kind is a sign of the times, and we should not be surprised to hear that the work has a good sale in the land of the Rising Sun, for it contains much useful matter, well arranged, well written, and with a good index. It is neatly bound in cloth, and among the many pocket-books of its class we do not remember a better sixpennyworth.

Primer of Scientific Management. By Frank B. Gilbreth. Pages viii. and 108. (London: Constable. 1912. 4s. net.)

The preface of this book explains that it is intended to supply answers to questions put to the publishers of the *American Magazine* as a result of articles in that periodical upon "The Principles of Scientific Management." This fact is said to be the reason, "in part, at least, why the book is not a complete treatise on scientific management."

The scientific management referred to seems to have as one of its features a somewhat extreme division of labour and to involve a multiplicity of foremen. Both these may possibly be useful in trades involving very many repetitions of any given operation, but would appear likely to make the life of a mechanic monotonous to the last degree. It is claimed that the system will give the biggest possible day's work and wage with the least possible expenditure of time, and this result would probably have its attractions for many. In some trades a wearisome monotony will in any case prevail, and such trades are probably those whose managers will derive the most useful hints from the book before us. In any case the author approaches his subject with the idea that the welfare of the operative is a matter to be considered equally with that of his employer, and contends that scientific management does this. Any system having a tendency in this direction will command sympathy, but the author's admission that his schemes tend to "keep the worker from being an all-round mechanic and instead make him a narrowly trained specialist" does not so well please. For the worker in the higher walks of, say, surgery, specialisation following on a good general training may be almost without drawbacks, but for the manual worker we fear that specialisation can very easily do harm. On the whole we are inclined to think that the full application of the methods advocated by the author is more suitable to America than to this country.

Competition Points for Gas Salesmen. By Arthur F. Bezant. (Published by Walter King, Office of the *Journal of Gas Lighting*. London. 1912. Pages xii. and 212. Price 3s. 6d.)

An interesting and useful book, frankly endeavouring to make the best possible case for the use of gas in preference to electricity. It is addressed to the gas salesman with the object of helping him in his duty of selling the product of his employers, whether company or other corporation, by putting him in possession of all the available facts and arguments for gas, and against other means of providing light and heat.

The subject is one of very general importance, there being few town dwellers who are not personally interested in it to some extent, financially or otherwise.

The author deals with it as regards direct cost of installation and maintenance, as well as with reference to efficiency, and discusses the relative merits of gas and electricity as affecting the eyesight of the user, the ventilation of rooms, the purity of the air, the preservation of bookbindings, and other important matters.

The special requirements and conditions of street, factory, shop, and domestic lighting, and those incidental to the lighting of public buildings are all dealt with, and a considerable space is devoted to cooking. Chapters upon Gas *versus* Electricity for Power Production, upon Fire Risks, Failures of Electric Supplies, and upon miscellaneous points complete the book.

Here and there—as, for instance, in the list of "Fires Reported to Have Been Electrically Produced"—the evidence adduced may be weak, and as to the whole book, we feel a desire for a corresponding volume prepared upon similar lines, but taking the opposite side. Nevertheless, provided the reader remembers the title and object of the book, it is full of instructive points.

The index might with advantage be amplified.

STORY OF THE MAIN DRAINAGE OF LONDON.

The London County Council have issued, at a price of 1s. 6d., a revised edition of the description, with plans and illustrations, drawn up by Sir Maurice Fitzmaurice, C.M.G., in 1909, of the main drainage of London. That system, we may mention, was originally instituted by the late Metropolitan Board of Works, whose first Engineer-in-Chief was Sir J. W. Bazalgette, M.Inst.C.E. The new work was carried out by him for the Board in 1856-74. Up to March, 1909, the London County Council expended more than 11 millions upon the drainage system of London.

ILLUSTRATIONS.

House in Rutland.

THIS is one of two alternative schemes prepared by Mr. H. S. Goodhart Rendel for a site in Rutland. The project has been abandoned. The conditions involved the incorporation of an old house and the irregular arrangement of the plan. The materials would have been those customary in the district—stone walls and roof, and leaded windows. The drawing was shown at the Royal Academy Exhibition this year.

Furze Hill, Willersey.

THIS house has been built in a very elevated position, commanding a wide prospect of the vale of Evesham and the Cotswold Hills, and overlooking the villages of Broadway and Willersey at about an equal distance from each. It is built of local stone in the local manner, and roofed with stone slates.

The house was designed by Mr. J. L. Ball, Director of the Birmingham Municipal School of Architecture, and was built by Messrs. Collins & Godfrey, of Tewkesbury. The heating apparatus, casements, leaded glazing, and lead rain-pipes were supplied by Messrs. Henry Hope & Sons, of Birmingham.

The Architectural Association Schools.

THIS "Study in Ornament" was prepared as a freehand drawing test of the end of the Third Year Evening School at the Architectural Association. The "Detail of a Fountain" and the whole design (p. 779) were shown at the A.A. Exhibition held last July. This design was part of a scheme of lay-out and planning of a library and site, being the principal subject in the Summer Term.

Mr. A. E. Maxwell is the holder of the R.I.B.A. silver medal (Drawings), the subject chosen being Compton Wynyates. Mr. Gerald C. Horsley, F.R.I.B.A., in his criticism of the drawings submitted for the Institute prizes and studentships, referred to these measured drawings and data as "an admirable example of what such a collection should be."

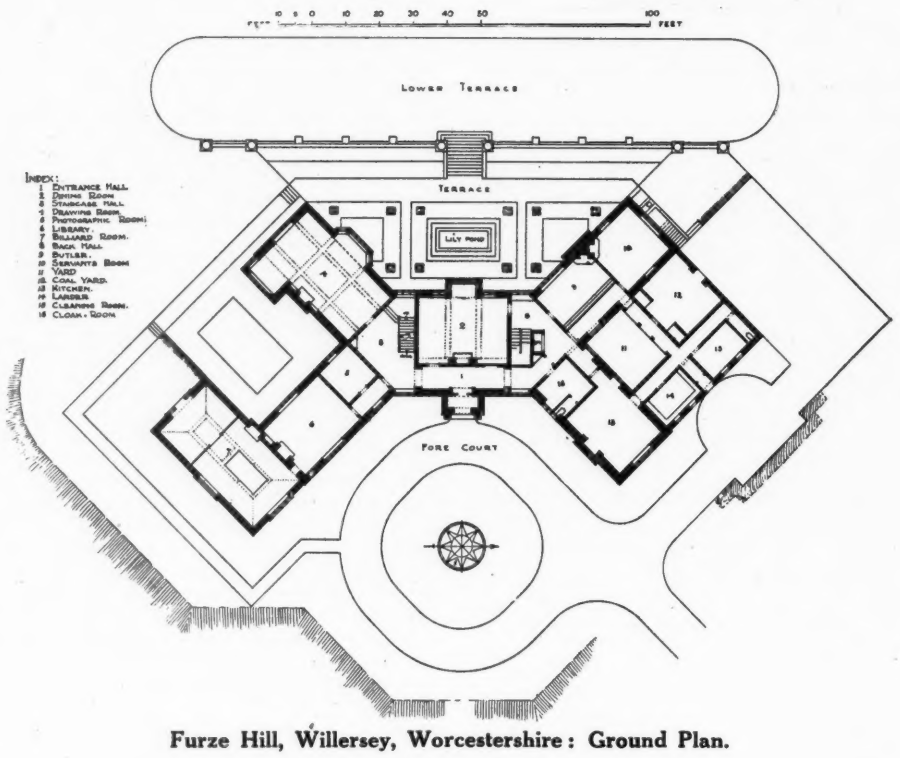
In his first year's course at the A.A. Schools Mr. Maxwell was awarded a special prize for excellence. He was also the winner of the freehand drawing test. His second year design, "A Garden Pavilion," was illustrated in the *Builder*, September 3, 1910. This was a subject set at the completion of the Day School course in the final test, in which Mr. Maxwell was placed first, receiving his Association Certificate with Honours. He then entered the Evening School, working in the daytime with a well-known firm of architects. Mr. Maxwell was born in 1891 in St. Petersburg, and was educated at Bowdon College, Cheshire, supplementing his studies at St. Petersburg, Berlin, and Paris.

The Church of Santo Spirito, Florence.

THIS church was built by Brunelleschi after the burning of the former church standing on the same site. The scale is considerable, equalling some of our smaller cathedrals in length, viz., 315 ft., while in width it equals the largest, being 191 ft. across transepts and 107 ft. over nave and aisles. The plan (p. 780) is in the form of a Latin Cross, and side aisles are led round choir and transepts. The ceiling of the central aisle is flat, but the square compartments of aisles are separated by transverse arches, and domed in simplest Byzantine fashion. The dome over crossing is on pendentive principles. It has a very low dome, forming an entablature in the interior and lighted by circular openings in the lowest part of the dome proper, which is of low altitude and of small external appearance. The interior is worthy of any age, most elegant in all its proportions and of solemn and majestic effect.

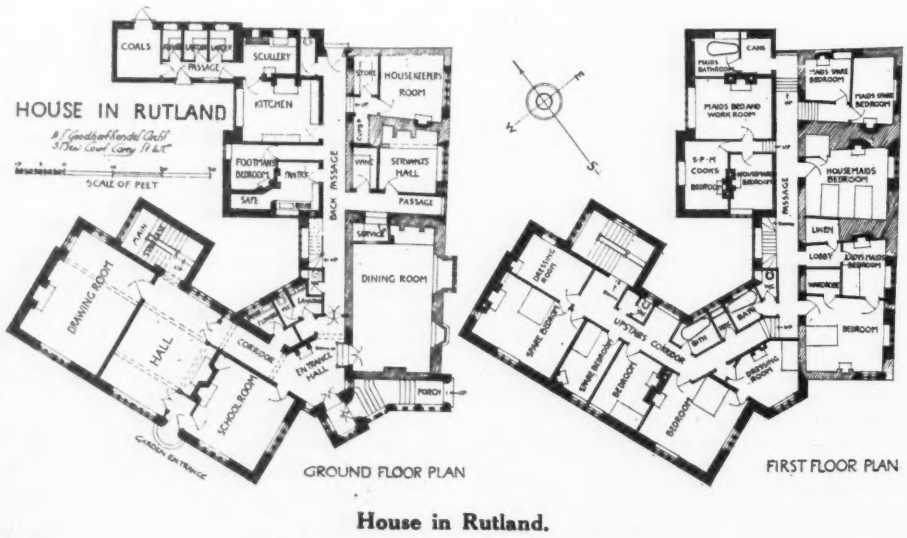
The tower was built at a later date by Baccio d'Agnolo. The Sacristy was erected between the years 1489–96 by Guiliano da San Gallo, associated with Pollaiuolo ("Cronaca"). The ante-room to the Sacristy consists of a corridor 42 ft. long by 19 ft. wide, and has a beautiful wagon-vaulted ceiling all of blue stone (pietra Serena), as is also the coloured portion of the drawings. The ceiling is divided into compartments enriched with carving and springing from an entablature carried by six Corinthian columns on each side detached from the wall. It was designed, according to Vasari, by Andrea del Monte Sansovino, about the year 1490.

For these measured drawings Mr. Walter M. Keesey was awarded an R.I.B.A. Certificate of Honourable Mention this year, the silver medal and ten guineas being won by Mr. Arthur E. Maxwell.



Furze Hill, Willersey, Worcestershire: Ground Plan.

Mr. J. L. Ball, Architect.



House in Rutland.

Design by Mr. H. S. Goodhart Rendel.

COMPETITION NEWS.

A list of current Competitions is printed on page 794.

Henry Saxon Snell Prize.

The subject given by the Royal Sanitary Institute in 1912 for the Essay in competition for this prize was "The Ventilating, Lighting, Heating, and Water Supply Appliances and Fittings for an Operating Room for a General Hospital." Ten essays were sent in. The adjudicators for the competition were Mr. Edwin T. Hall, F.R.I.B.A., Dr. Louis C. Parkes, and Mr. A. Saxon Snell, F.R.I.B.A.; and they had the advantage of the criticisms and suggestions made by Sir Frederick Treves, Bart., G.C.V.O., who acted as consulting referee. Acting upon the advice of the adjudicators and of the consulting referee, the Council have decided to divide the prize of fifty guineas, giving one-half the sum to Mr. John Darch, M.R.San.I. (Wandsworth), writing under the motto "Aseptos," and the other half to Mr. H. F. V. Newsome (Manchester) and Mr. John G. Cherry, M.R.San.I. (Manchester), writing jointly under the motto "Magnum Bonum." The adjudicators consider that there are many excellent suggestions in each of these essays, but, on the other hand, there are some which they consider would prove unsatisfactory in practice. A bronze medal of the Institute will be awarded to each of the successful competitors. The adjudicators also commend the essays sent in under the mottoes:—"Science moves but slowly, slowly creeping on from point to point," "Ajax," and "Tout bien ou rien."

Schools, Newcastle-on-Tyne.

The following are the authors of the premiated designs in the competition for the Rye Hill Council School, Newcastle-on-Tyne:—(1) Mr. J. H. Morton, F.R.I.B.A., 57, Westgate-road, Newcastle-upon-Tyne; (2) Messrs. Harrison & Ash, 14, Grey-street, Newcastle-upon-Tyne; (3) Mr. Edwin F. W. Liddle, 12, Eldon-square, Newcastle-upon-Tyne. And in the competition for the Cruddas Park Council School the following have been successful:—(1) Messrs. Harrison & Ash, 14, Grey-street, Newcastle-upon-Tyne; (2) Messrs. Wright & Chapman, 38, Grainger-street, Newcastle-upon-Tyne; (3) Mr. W. H. Knowles, 25, Collingwood-street, Newcastle-upon-Tyne. The competitions were open to local architects only.

BOOKS RECEIVED.

ENGLISH HOMES OF THE RENAISSANCE. By H. A. Tipping, M.A., F.S.A. (London: *Country Life*. 2*l*. 2s. net.)

Alexander Koch's HANDBUCH NEUZEITLICHER WOHNUNGS-KULTUR.

NATIONAL INSURANCE. J. H. Watts. (London: Stevens & Sons, Ltd. 12s. 6d.)

CORRESPONDENCE.

Fire Protection and the London County Council.

SIR,—Mr. Horace Cubitt's able letter in your issue of the 13th inst. may be divided into four sections. In the first place, he points out that owing to the neglect of the local authorities there are frequently relatively greater fire dangers to be met with in the provinces than in the metropolis, and he suggests that the state of affairs requires remedy.

I fully concur with Mr. Cubitt that in many localities in the provinces the state of affairs is scandalous, and this is often most evident in matters relating to the safety of industrial buildings or stores that cannot be brought under the Factory and Workshop Act. But for reasons best known to themselves many local Councils do not even seriously put into force the powers they have in respect to factories and workshops under sect. 14 and 15 under the Factory and Workshop Act of 1901, and there are quite a number of local authorities that have not yet even made the necessary by-laws which they have power to frame under the last-named section. The central authority on factory and workshop matters unfortunately has little or no power over these neglectful local authorities, and the result is that, unless the factory inspector can persuade the building owner to act fairly, the necessary fire precautions for such buildings are most difficult to enforce.

The only remedy against these apathetic local Councils that appears feasible is to give the central authority some additional powers for bringing them into line with, say, some proviso that the central authority can, if necessary, take the matter in hand itself at the expense of the local authorities in question.

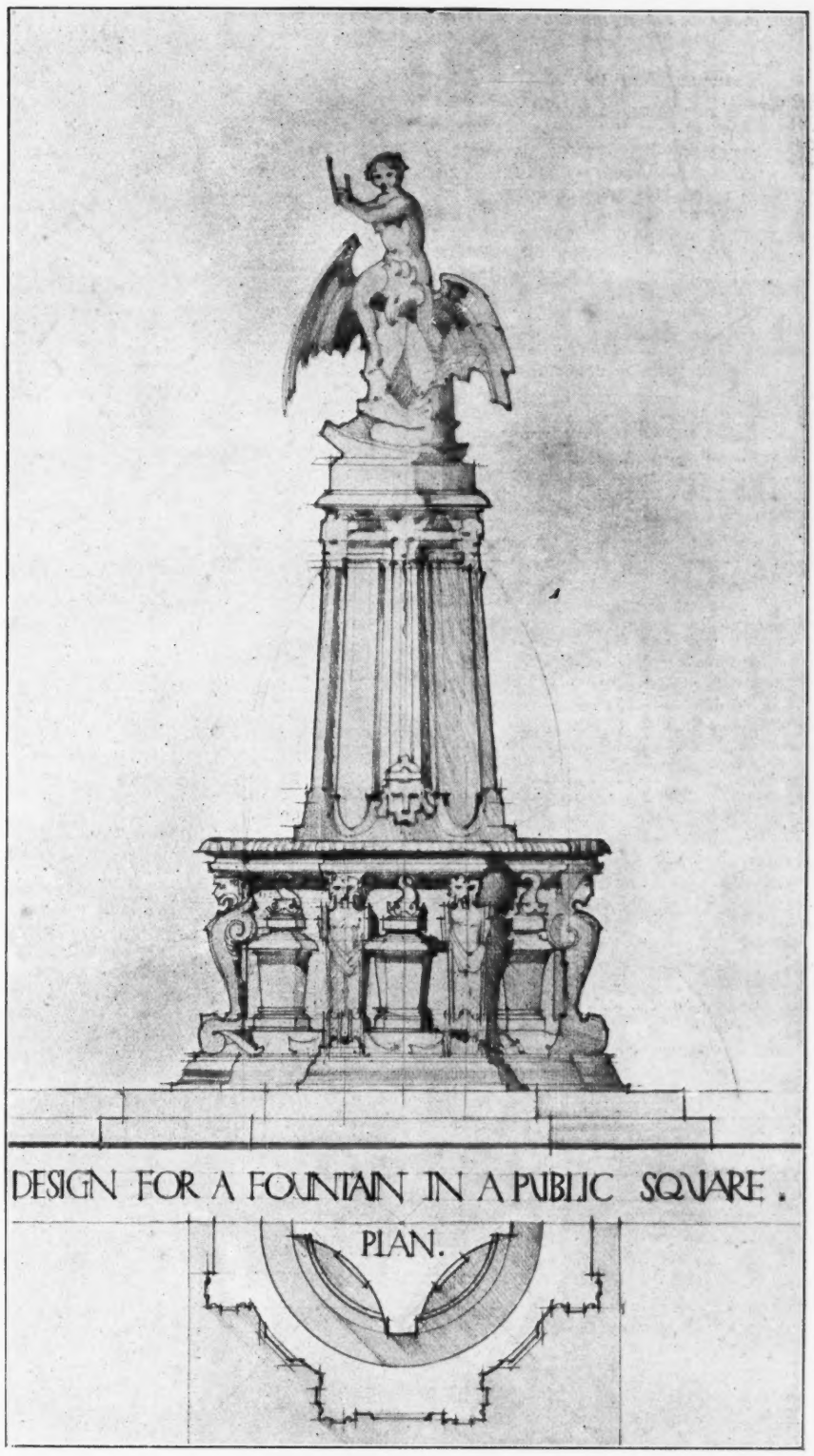
Regarding the second section of Mr. Cubitt's letter, in which he argues that "it may be generally conceded that the London County Council, in putting their powers in force in a gradual manner, are acting reasonably," I differ entirely. It is unreasonable of the London County Council to allow the many users of the buildings in question who do not happen to be building owners—including the many employees of the latter—to run the unnecessary risk of fire they now have to owing to the delay in enforcing the Building Acts (Amendment) Act of 1905. It is also unreasonable to place so many building owners in such a position as they are in at present where they do not know how or when they may be called upon to make structural alterations—may be, just after they have redecorated their premises. It is unreasonable to spread five years' work over a period of five centuries and to take the few (527) individual cases that have been put in order under sect. 9 during the past seven years in the present haphazard fashion

In the third section Mr. Cubitt apparently desires to argue that matters of fire prevention and matters of escape from fire are not very similar things. Originally fire prevention was purely considered to be a small chapter in the general subject of fire protection dealing with the precautionary measures against the actual outbreak of fire due, for instance, to individual negligence, defects in electric wiring, etc. Gradually the subject grew to what might be termed fire prevention in the wider sense, which included the prevention of the spread of fire and the spread of smoke, and the escape from fire and smoke. To-day the term fire prevention may be said to cover everything relating to building construction and equipment that may prevent the outbreak of fire, prevent the spread of fire, and prevent the loss of life from fire.

As to the fourth section of Mr. Cubitt's letter as to whether the more populous areas of the metropolis are more dangerous from the fire point of view than the less populous ones of the provinces, this is certainly a very debatable subject of wide issues. Without wishing to indicate concurrence with Mr. Cubitt's views, I will gladly agree that the provinces require fully equally that "stirring up" that is at present being applied to the London County Council.

In conclusion, but one additional word to Mr. Cubitt as a former member of the architectural staff of the London County Council, and that is that I wish to emphasise, as I have tried to throughout this correspondence, that whatever may be the failings of the London County Council in its corporate capacity, my strictures in no way reflect in the slightest degree on any member of the Council's Building Act Department. The remarkable efficiency and strenuousness of Mr. Riley and his chief assistants are as well known to me as their tactful handling of delicate or difficult technical cases, and it is only a pity that such a splendid staff should be working for such a sluggish Council.

EDWIN O. SACHS.



A Design by Mr. A. E. Maxwell. (*See Plate for detail.*)

Intercepting Traps.

SIR,—If only in the interests of historical accuracy, some comment seems desirable on the reference to German house drainage practice found at page 40 of the Departmental Committee's Report on Intercepting Traps. Mr. Durham's statement favours the assumption that the omission of these appliances originated with one of the English engineers of the Frankfort sewerage system, and that the treatment of house drains in that and other cities constituted, in this respect, a new departure. I find it difficult to reconcile this with my recollection of the facts in regard to Frankfort after an interval of forty-five years.

So far from the absence of intercepting traps being a feature of the Frankfort house drainage regulations, compiled in 1868, these expressly enforced their provision for all liquid wastes to be installed in a brick chamber at least 3 ft. in diameter and provided with a stoppered central opening—*i.e.*, for cleaning only. Plans of typical house drainage systems, accompanying the regulations, showed in several cases the necessity for two such traps and chambers in order to avoid the passage of fæcal matter through an interceptor, it being a cardinal feature of the plan that water-closets and their extended soil pipes should be directly connected with the street sewer.

It is clear, therefore, that the principle of disconnexion—that is to say, the provision of a main undergrourd trap in addition to the small seals on each waste-pipe—was a feature of the original Frankfort system. The essential difference between this method and that which has been ruthlessly imposed upon English sanitary boards since 1877 lies in the inclusion of water-closets under the model by-laws—a course which no reader of the present Report can fail to recognise as a grave mistake. The genesis of this latter method can be traced to the outbreak of typhoid in Uppingham School in 1875, and to the subsequent report thereon by an engineer no longer with us. In view of the disclosures of the Departmental Committee in regard to the putrid condition of house sewage discharged into public sewers

after a varying retention in the intercepting traps, there is a grim humour in the stress laid in the Uppingham report upon the necessity for "the immediate and complete removal from the house of all foul matter the moment it is produced"—quoting from a review in the *Sanitary Record* of March 25, 1876.

A municipal guide-book, published in English by the Frankfort City Engineers' Department in 1907, states that house drainage regulations were "laid down in the years 1873 and 1875; but as these dating from the commencement of sewerage operations are somewhat antiquated, amongst others, in reference to the disconnecting traps, it is proposed to issue shortly new regulations. It would be of interest to learn in what direction the proposed revision was made. If disconnexion of slop-drainage lines is now abolished, the Frankfort system will be practically on all-fours with modern American practice. The English principle of interception, at first copied in America to the extent of a plain "running-trap," without air inlet, has given place to a reliance upon good design, workmanship, and materials, as opposed to the worship of a house drainage fetish. In particular, American practice offers an example to English sanitarians in the absence of the repulsive discharge of slop-water over external gratings—a method barred by climatic conditions during at least four months of the year. The prospective success achieved in securing the abolition of the innumerable foul cesspools constructed on English house-drainage lines during the last three decades augurs well for a crusade against these other eyesores and potential nuisances.

Winchester, Mass., U.S.A. JOHN S. HODGSON.

[*** Since the publication of the Report on Intercepting Traps in House Drains there has been so much interest evinced in the subject that we do not hesitate to publish the above letter, although, as our previous comments show, we are not at all convinced of the wisdom of abolishing the trap. It appears that the opponents of the trap are chiefly found among those in search of a ready means of ventilating sewers—a matter to which the Report (page 41) says too much importance has been attached, because "the necessity for ventilation has been exaggerated."

We venture to think that the low-level fresh-air "inlet" (as often as not it is acting as an outlet) is quite the worst feature of the present orthodox arrangement, and the Report indicates that this may be omitted altogether. We would also like to keep before the public the conclusion that the trap "does serve as an effectual barrier to the entry of sewer air into the house drain." It is also admitted that there is "a considerable body of medical opinion which retains the view that certain diseases, notably typhoid fever, diphtheria, quinsy, and sore throat, and certain septic diseases, are fostered or are even actually produced by exposure to sewer or drain air." Further, though, of course, the trap is not an absolute barrier to rats, we know that they only pass it on exceptional occasions.—ED.]

INTERCOMMUNICATION COLUMN.

Is a Draughtsman Too Old at Fifty?

SIR,—Architects advertising for assistance invariably ask for "age, experience, and salary," or they state "must be between twenty-five and thirty-five" or "not over thirty-five." Will any of these architects explain how they arrive at this age limit? I ask the question because during the last eighteen months I have answered over forty and never got a reply. My age is forty-nine.

Why is there this demand for assistants who are, more or less, still in their experimental years in preference to those who have passed them? A water-colour painter is at his best between forty and sixty. His works, after years of mistakes, contain no flaws. So with the draughtsman. Or has he become old and tired, while the employer becomes young and energetic? While I was of the age in demand I was considered second to none, and sought after. Yet the mistakes I made were appalling. Now, when I can avoid them, it appears I have long passed the age limit, and therefore have to draw blanks. . . . . During twenty-five years I have never seen an advertisement for a draughtsman or assistant of fifty. Yet, if he has kept with the times, his knowledge through experience must be great. "Not over thirty-five" is no fallacy. . . . A winner of competitions, my testimonials containing "able designer and constructionist, high character, steady and reliable, rapid and accurate, etc.," one would think no great difficulty would present itself. All I know is, that I am confronted in my struggle to live by this set-up convention of an age limit, which so successfully holds its own. STOIC.

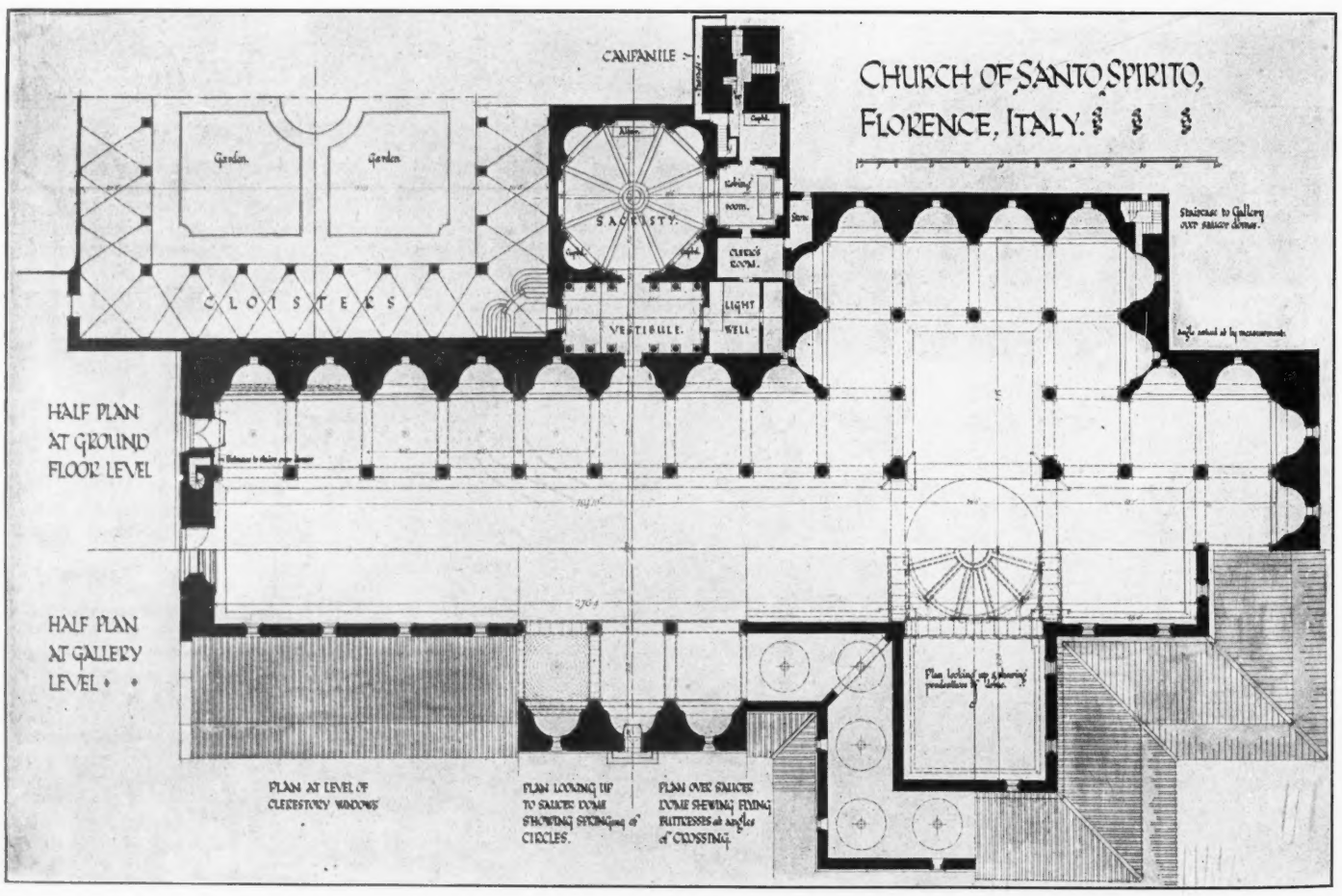
FIFTY YEARS AGO.

From the *Builder* of December 27, 1862.

Theatre Royal, Westminster.

PHILIP ASTLEY'S name in connexion with a circus has lasted exactly a hundred years to a week. The cavalry soldier began his venture in a Lambeth field in 1763, and set up his first wooden enclosure on the site of the present theatre in 1773, building it partly, according to Mr. Timbs, with 60*l*., the produce of an unowned diamond ring found on Westminster Bridge. This energetic individual (who told his horn-blower, when he found him "counting the bars" till his turn came in the overture, that he paid him to play and not to "rest" and wouldn't have it) built nineteen theatres, including the original Olympic in Wych-street. Astley's has been burnt down three times and rebuilt; the fire on the last occasion, in 1841, leading to the insanity and death of Ducrow, the manager, whose skill and grace as a circus-rider have not been equalled since. And now Mr. Boucicault has quietly wiped out the circus, and under the title of "Theatre Royal, Westminster" (a misnomer, by the way, let us say with all gentleness), has prepared for the public a very commodious interior for the enjoyment of stage plays.

*** While referring in a recent "Note" to the demolition of some of the Paris theatres, we spoke of the Cirque Impériale—now known as the Châtelet—having been opened in 1780 by "un équyer Anglais" named Astley. In the same year his London establishment, in St. George's Fields, was converted into a covered amphitheatre. It was only a timber structure, and was twice burned down. A building with a simple classic front took its place in 1820. Dion Boucicault's management did not last long, and the house reverted to its old calling in 1873 under "Lord" George Sanger. Philip Astley died in Paris in 1814. Another of the transpontine theatres, the old Surrey, for many years a rival to Astley's as a circus, had later as manager, the actor Elliston, who, as we all know, was the subject of one of Elia's Essays.—ED.


CAMPANILE
CHURCH OF SANTO SPIRITO, FLORENCE, ITALY.
Garden.
Garden.
SACRISTY.
CLOISTERS
VESTIBULE.
LIGHT WELL
HALF PLAN AT GROUND FLOOR LEVEL
HALF PLAN AT GALLERY LEVEL
PLAN AT LEVEL OF CLERESTORY WINDOWS
PLAN LOOKING UP TO SAUCER DOME SHOWING SPRINGING OF CIRCLES.
PLAN OVER SAUCER DOME SHEWING FLYING BUTTRESSES AT ANGLES OF CROSSING.

R.I.B.A. Measured Drawings Prize: Certificate of Honourable Mention awarded to Mr. Walter M. Keesey.

CONSTRUCTION & ENGINEERING REVIEW

Fig. 1. New York Grand Central Station and adjacent Buildings.

NEW YORK GRAND CENTRAL RAILWAY-STATION.

THE New York Central and Hudson River Railroad is the only railway having western connexions for both freight and passenger traffic direct to Manhattan Island. Trains enter the city over the four tracks of the New York Central, which skirt the east bank of the Hudson River and run over the two-track line from Chatham. The former route was originally the freight line, while the latter was the original passenger line to Albany and the west. The New York Central passenger traffic enters the Grand Central Terminal in conjunction with that of the New York, New Haven, and Hartford Railroad.

History of the Grand Central Station.

The precursor of the present station was built in 1832 by the New York and Harlem Railroad, now a part of the New York Central system, about 3 miles south of the new Grand Central terminus. In 1857 the station was removed to Twenty-sixth-street on the site of the present Madison-square Garden.

This station was shared jointly with the New Haven Railway, but in turn it became too small, and in 1871 the original Grand Central Station was built.

In 1900 the station was enlarged by the addition of three stories and an increased number of lines.

It soon became evident, however, that nothing but entire reconstruction would meet the ever-increasing traffic requirements. At the same time it was recognised that the substitution of electricity for steam offered the only cure for the objectionable atmospheric conditions existing in the Park-avenue tunnel at the entrance to the Grand Central Station, but it was not until 1903 that legislative action was taken directing the complete abandonment of steam locomotion in Park-avenue within a period of five years.

In the same year the railway company and the city authorities agreed upon radical changes which were possible only with the abandonment of steam traction. From a civic standpoint the most important of these changes, is the depression of the whole terminal so as to permit the extension of highways over the tracks from Forty-fifth to Fifty-sixth streets, inclusive, thus joining two sections of the city, hitherto separated by three-quarters of a mile, by an impassable barrier of railway-yards and buildings, and to permit also the continuation of Park-avenue so as to make it, by means of an overhead bridge at Forty-second-street, a continuous north and south thoroughfare.

Design of the New Station.

The design of the new terminus presented a problem of no small magnitude. Twice the railway company had been compelled to move their terminal northwards, and it was very desirable that the strategic position of the station in the heart of the city should be maintained, so that the heavy passenger traffic might continue to be brought into the centre of the city, yet without creating a public nuisance in the high-class residential quarter through which the line runs south of the Harlem River.

Other important considerations were the provision of accommodation for existing car and train requirements, together with probable future increases, and the necessary facilities for mail, express, and baggage traffic, together with arrangements for the cleaning and preparation of equipment for the return journey.

The new scheme provides two levels of tracks, the lower level being joined to the upper level by four approach tracks, two inward having grades of 3 per cent. and two outward having grades of 2·7 per cent. Under the lower tracks three transverse subways are provided for transfer of mail, baggage, and express traffic, and for piping across the yard.

Above the upper tracks are carried the transverse streets, with one longitudinal avenue in the centre which, at Forty-fifth-street, is diverted to the east and west around the station building, the easterly branch being reserved as a private way for baggage and mail vans and the westerly branch joining Vanderbilt-avenue, together with an elevated roadway next the terminal building, by which vehicular traffic is maintained over Forty-second-street to join the present Park-avenue at Fortieth-street.

The buildings comprise (1) the station building proper; (2) a post-office and office building, in which are the premises of the American Express Company; (3) a sub-station for transforming high-voltage alternating current to 660-volt direct current for traction and to low-voltage direct current for operating signals; (4) a heating and lighting plant building of capacity sufficient for all the buildings; (5) an accumulator-house for storage batteries to supply traction and signal current in case of failure of the sub-station or during extreme loads; (6) the Adams Express Building; and (7) the Merchants' and Manufacturers' Exchange Building. The remaining building areas between the proposed street lines will be occupied as soon as satisfactory arrangements can be made, some buildings not mentioned above being already under construction. Fig. 1 is a bird's-eye view of the station and adjacent buildings, and Fig. 2 is a view showing

Fig. 2. New York Grand Central Station: Building Sites over Train-yards.

ome of the available building sites over the rain-yard.

The Station Building Proper.

This is appropriately the dominating feature in the Grand Central group of buildings. It extends longitudinally from Forty-second to Forty-fifth streets and transversely from Depew-place to Vanderbilt-avenue, and covers an area measuring 722 ft. long by 301 ft. wide at street level. Below street level the station is 745 ft. long by 455 ft. wide.

In designing this building the architects had in mind an expression of the old terminal idea, which is that of a gateway to the city. Hence the main entrance to the station on Forty-second-street is in the form of a triumphal arch with three openings, each being 33 ft. wide and 60 ft. high. In this building are situated the waiting-rooms, concourses, baggage-rooms, and other facilities for travellers.

The principal hall is the main outward or express concourse. It is 272 ft. long by 120 ft. wide by 125 ft. high, and, as may be gathered from Fig. 3, a dignified simplicity of architectural detail has been preserved, while the interior, finished with Botticino marble, gives a warm and pleasing effect. In the concourse are the ticket offices, information bureaus, parcel-room, baggage checking department, and all the usual conveniences expected by American travellers.

The various offices and rooms are arranged so that the movement of the traveller is a progressive one, the ticket window coming first, the Pullman window next, the baggage office third, and so on in regular sequence. Stairways are obviated by inclined ways along which passengers proceed directly from the concourse to the train platforms, the concourse being slightly higher than the train platforms. The main waiting-room between the concourse and Forty-second-street is another hall of monumental proportions. The suburban concourse is directly beneath the express concourse, and is of the same area, although the ceiling is not so lofty.

One of the unique features of the station is the use of inclined ways instead of stairways, all the levels used by passengers being connected in this manner. Suburban traffic is separated from main line traffic and the incoming from the outgoing traffic, so that all passengers on any one inclined way move in the same direction, thus obviating undesirable congestion.

Fig. 4 is a section in perspective which serves the purpose of illustrating the general arrangement of the station and the means provided for access to and from the streets and the various metropolitan and suburban lines.

The new terminus will have direct subsurface connexions with the Interboro Subway, the Hudson and Manhattan tubes to Jersey City, the Belmont Tunnel to Long Island, and the Lexington-avenue Subway now under construction. This will establish intercommunication between the New-York Central lines and the interurban lines, so that every part of New York shall be in direct touch with the Grand Central Station.

In establishing the various levels of the terminus the main concourse floor was built level with the mezzanine or ticket office floor of the existing Interboro Subway, as it was estimated that 80 per cent. of the passengers departing from or arriving at the terminus would use the subway to commence or finish their journey. The level of the concourse floor having been established was used as a basis for working out the levels for the remaining part of the building.

The station for inward traffic is situated on the west side of Vanderbilt-avenue between Forty-third and Forty-fourth streets. Passengers arriving may proceed to an hotel, to the street, to the subways, or to the cabstand without crossing the path of a single outward passenger, thus eliminating a source of confusion which is very evident in most large railway-stations. The arrival station is provided with a waiting-room of ample proportions over the express level tracks, and means of pedestrian communication between the arrival and departure stations are provided by a subway below Vanderbilt-avenue.

Suburban Lines.

This part of the station includes seventeen tracks alongside the platforms, two reserved for baggage, and five additional tracks on the west which will be used for transferring trains from the arrival to the departure side by way of the loop shown. The storage yards are to the north of the station tracks.

The platforms vary from 14·33 ft. to 26 ft. wide, the passenger platform being 4 ft. above rail level, and the baggage platforms 4 ft. 3 in. above the same level.

Express Lines.

The arrangement of the express tracks and platforms is indicated in Fig. 5. There are forty-two tracks at the south end, some of these resting on rock, while those over the suburban lines are supported by a concrete floor carried by steel columns and girders.

There are three transverse subways in the express station, one at Forty-third-street for pipes, mail conveyors, and baggage trucks; one at Forty-fifth-street for baggage trucks, containing quarters also for storage and cleaning, together with a space for pipes; and a pipe subway north of Forty-eighth-street. On the westerly side of the station the three transverse

Fig. 3. New York Grand Central Station: Interior of Concourse.

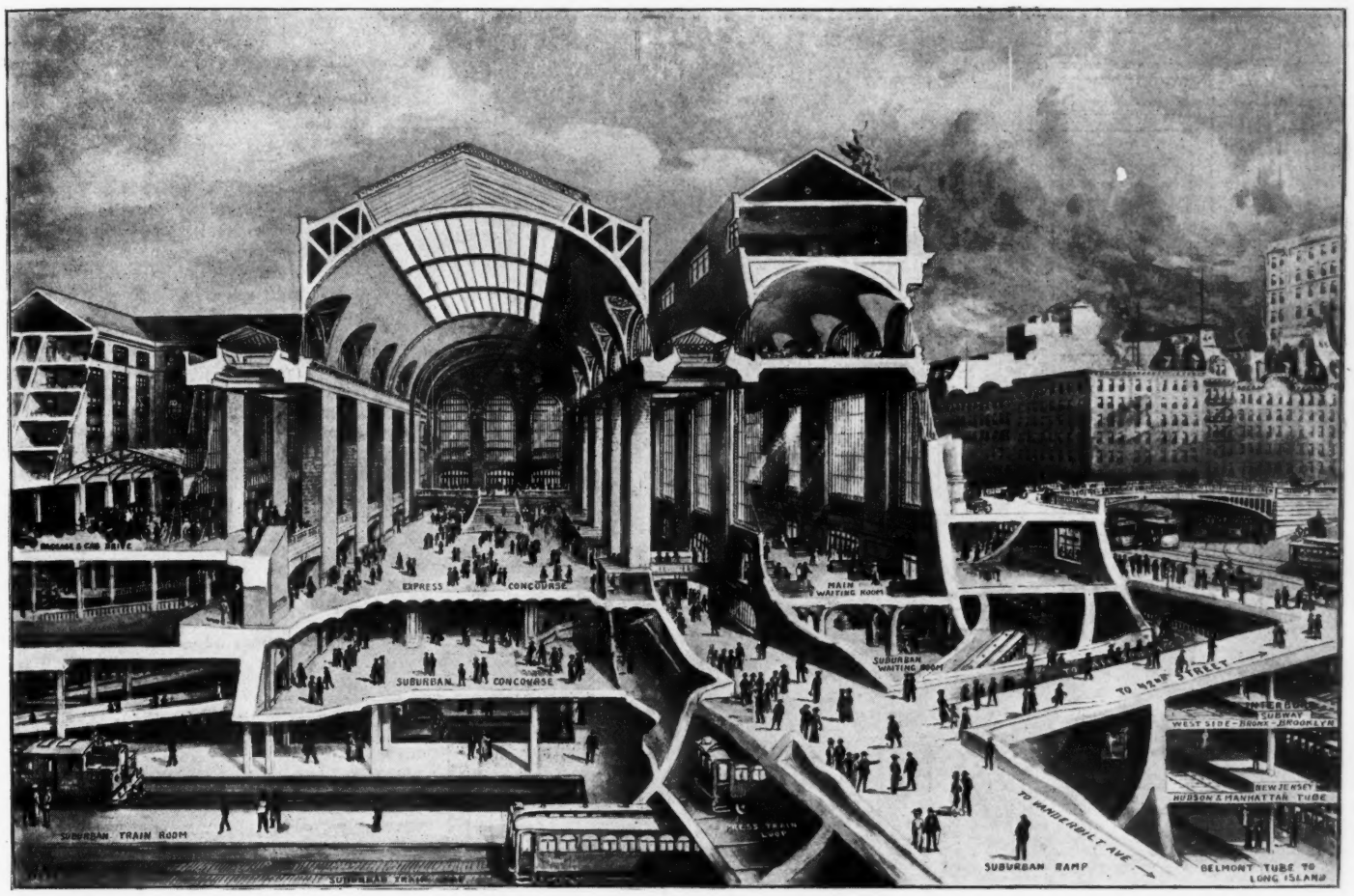


Fig. 4. New York Grand Central Station: Perspective Section.

subways are connected by a longitudinal pipe subway. On the easterly side the pipes are carried in a gallery above and east of the trucking platform and connected with the three transverse subways.

The suburban and express platforms are of reinforced concrete, and a general idea of their construction may be obtained from the longitudinal and transverse sections in Fig. 6.

The steel columns supporting the viaducts and buildings are protected by an encasing concrete pier for a distance of 7 ft. above rail level, where adjacent to running tracks, and for 4 ft. 6 in. above rail level where adjacent to a station or storage track. Above the protection pier the columns and girders are protected by concrete applied on wire fabric.

Street Viaducts.

Park-avenue and the transverse streets are carried on steel columns, some of which rest on the suburban roof steelwork and some on solid rock, these columns supporting a system of beams which in turn carry the concrete floors. Most of the viaducts carry city gas and water mains and electric conduits, and all are paved with sheet and block asphalt.

A feature of the viaduct design is the rearrangement of Park-avenue, where separate ways for mail, baggage, express, and cab traffic eliminate the vehicular congestion that characterised the old terminus, while the extension of Park-avenue has provided a new north and south thoroughfare of great value to the city under which will pass the heavy vehicular and car traffic of Forty-second-street.

Steel Designs.

The steel structure supporting the roof over the suburban lines is designed not only to carry the main yard tracks, but also to support the columns of the cross-street viaducts, Park-avenue extension, and future buildings to the east of Park-avenue, those to the west being supported by independent columns.

As the arrangement of the tracks of the suburban and express stations is not identical, the disposition of the columns varies at the two levels; consequently some of the columns carrying structures over the main yard are supported on girders in the suburban station roof, a somewhat costly method of procedure rendered necessary by the paramount importance of the track lay-out.

The suburban roof, forming the express station flooring, was designed for the following loading on each track—Two 142-ton engines, followed or preceded by a uniform train load of 4,500 lb. per linear foot, or a special loading of 120,000 lb. equally distributed on two driving axles spaced 7 ft. centre to centre and followed by a uniform train load of 4,500 lb. per linear foot, commencing 5 ft. from the axle.

In designing the column footings the allowable bearing of steel on concrete for the live load was 250 lb. per square inch and for the dead load 500 lb. per square inch.

The building laws of the city of New York were followed in proportioning the structures for the support of loads from the columns intended to carry buildings. The floor loads from these proposed future buildings average about 1,800 lb. per square foot over the area of the suburban roof to be covered, and the average load from building walls is about 45,000 lb. per linear foot of the building wall.

Two types of construction were adopted in the design for the steelwork of the suburban roof, and which may be designated as longitudinal and transverse, corresponding to the direction of the girders forming the direct supports of the express level track. In general, the longitudinal construction has been used to the south of Forty-eighth-street, and the transverse construction to the north of that street.

To the south of Forty-eighth-street the columns in both stations are disposed in transverse lines normal to the axis of the yard, and spaced 20 ft. apart, except at the transverse streets, where the spacing varies to conform with the spacing of the viaduct columns, and their situation relative to the adjacent outer line of the building columns.

The general character of the construction is illustrated by the sections reproduced in Fig. 6.

All the steel construction is protected against fire. In most cases the girders are framed into the column shafts. The columns rest on grillage footings on solid rock, except in a few instances in Park-avenue, where the rock was at such a depth that caisson foundations were necessary.

In most cases where the building columns are supported on the transverse girders it has been necessary to provide twin transverse girders, as the loads to be carried are of such magnitude as to preclude the use of a single girder. Heavy I-beam grillages resting on the tops of the twin girders are used for distribution of the column loads. The maximum bending moment for each of the twin girders is 8,400,000 ft.-lb, the maximum end shear being 704,000 lb. The greatest load transmitted by one of the columns to the transverse girders is about 1,800,000 lb.

The heavy girders spanning the suburban station have necessitated a considerable roof depth, the distance from the rail level in the express station to the underside of the fire casing on the transverse girders varying from 8 ft. to 10 ft. To the north of Forty-eighth-street the distances between the express and suburban tracks decrease, with a corresponding decrease in the depth of the roof, which is reduced to 4 ft. 6 in. at Fiftieth-street. In this latter type the concrete arches are carried directly by transverse plate girders of 20 ft. to 45 ft. span and spaced from 3 ft. 6 in. to 4 ft. 6 in. apart.

Along the east and west sides of the suburban station the ends of the transverse girders rest on the concrete retaining wall. Continuous longitudinal steel bents, composed of box girders framed into the columns, form the intermediate supports of the transverse beams, the ends of which rest on the top of the longitudinal girders, which are of the box type, having a depth of from 4 ft. to 5 ft. and a maximum span of 20 ft.

The entire suburban station roof is supported on heavy riveted columns of rectangular cross-section built up of plates and angles.

Drainage and Conduits.

The entire area of the terminus, with the exception of the three subways, is drained by gravity by a low-level sewer in Forty-sixth-street, connecting with an outfall into the river. The subways are drained by sumps, from which the water is delivered to the sewer by electrically-operated centrifugal pumps.

The tracks are drained by means of catch basins placed in the ballast or concrete, as the case may be.

A very complete system of hot and cold water, steam, compressed air, and vacuum cleaning pipes has been installed throughout the station and sidings. A complete fire-protection system is installed on both levels with nearly 300 hose reel connexions at frequent intervals, and a fire-alarm system is provided with 125 boxes connecting with a central station from which the City Fire Department may be called if required to assist the railway fire brigade.

In addition to having duplicate lighting installations, 10 per cent. of all the lights are on an independent system, so that the station can never be left in total darkness.

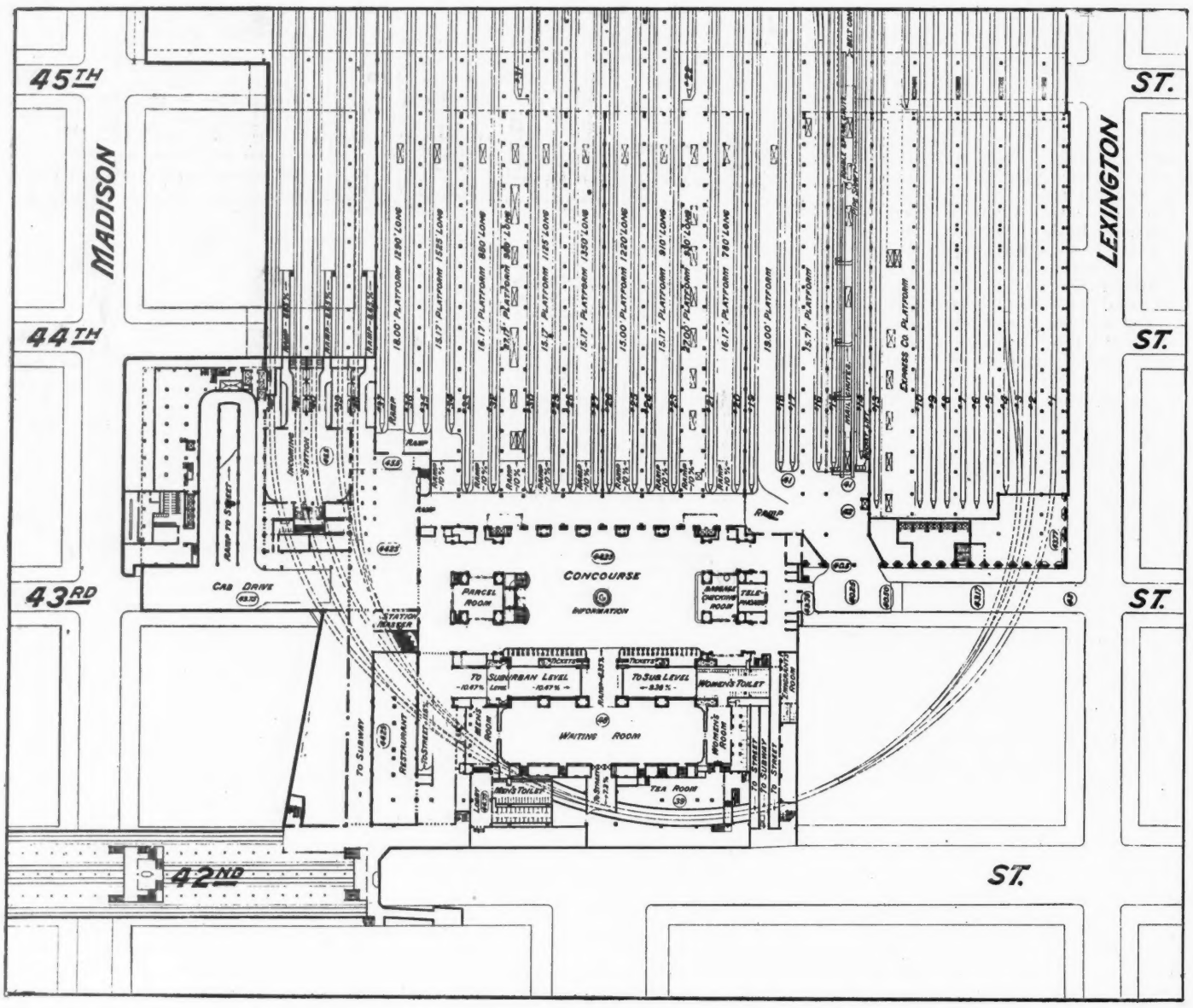


Fig. 5. New York Grand Central Station: Part Plan at Express Line Level.

Execution of the Works.

Before commencement of the works for the improvement of the Grand Central Station in 1903 all trains entered the terminus at Forty-second-street through the four-track masonry tunnel in Park-avenue, the southerly limit of which was at Fifty-sixth-street. Thence the tracks ascended about 17 ft. to Forty-ninth-street in a cutting and entered an open yard, remaining at street level until the station proper was reached. The yard was of irregular area, about two city blocks in width at the widest part by seven city blocks in length, and covered 23 acres of land. The establishment included 11·3 miles of tracks and various buildings used for passenger and freight traffic and other purposes.

To the north of Forty-ninth-street vehicular traffic was maintained on both sides of Park-avenue, the railway lines occupying only the middle of the street. Between Forty-ninth and Forty-second streets the tracks opened out into the terminal yard occupying the full width of Park-avenue. Vehicular traffic was carried across this yard by inclines, with a long-span truss bridge over Forty-eighth-street and a girder bridge over the cutting in Park-avenue between Fifty-first and Fifty-second streets. Foot bridges elevated above the street level and approached by stairs—with the exception of one at the east end of Forty-seventh-street, which had an incline approach—crossed the yard at Forty-sixth, Forty-seventh, and Forty-ninth streets, and the cutting at Fiftieth, Fifty-third, Fifty-fourth, and Fifty-fifth streets.

The conditions as then existing, quite apart from the nuisance caused by steam locomotives, were extremely unsatisfactory, not only for the railway company, but also from the standpoint of civic design.

The reconstruction scheme involved far more than the building of a new station, and included the numerous important operations enumerated below in the order in which they were undertaken.

The removal of all buildings; the rearrangement of the engine tracks at the Forty-seventh-street turntable; the moving of tanks and other conveniences in the rear of the New Haven engine-house; removal of car-cleaners' and supply quarters to the end of the tracks on Forty-fifth-street; transfer of Adams's Express business to Madison-avenue; the removal of milk traffic entirely outside the terminus; the closing of Park-avenue East and Park-avenue West to all but pedestrian traffic; the grading of Park-avenue West down to the level of the present tracks, followed by the laying of two new tracks on the surface prepared to compensate for the removal of the original easterly tracks along Park-avenue, which was used in conjunction with the new roadbed under Park-avenue East, or, in other words, widening the Park-avenue tunnel and throat of the yard between Fifty-sixth and Fifty-seventh streets on opposite sides alternately, and increasing the original four tracks to ten; excavation for the depressed yard between Park-avenue and Lexington-avenue was then made, and retaining walls and new tracks built within the area excavated; the station traffic having been transferred to these new tracks, excavation for the westerly portion of the depressed yard between Park and Madison avenues was commenced and is now under way; the excavation was followed by the construction of retaining walls, steelwork, the laying of tracks for regular service, and construction of the street viaducts for Park-avenue, and for the intersecting streets south of Fifty-seventh-street; the new station was then built, together with some of the buildings between cross streets over the areas occupied by tracks, and the temporary station is to be abandoned shortly.

The preliminary works comprised the removal and replacement of city sewers, gas and water mains, the removal of buildings on the site of the station-yard extension, the removal and rebuilding of some transverse bridges, and the rearrangement of switch and signal plant.

About 25 miles of sewers and pipes were removed or replaced, and about 10 miles of this work was completed before the general excavation was commenced. A new collecting sewer was built in Park-avenue from Forty-ninth to Fifty-fourth streets, intercepting the old sewers under nearly all the intervening streets and delivering their flow to a new 4-ft. 6-in. by 3-ft. sewer, built in tunnel across Park-avenue under the depressed tracks, and connected with the existing Third-avenue sewer. The drainage from other sewers intersecting the yard excavation was provided for by a new sewer from Madison-avenue and Forty-eighth-street to Lexington-avenue and Forty-second-street.

In September, 1903, excavation was commenced on the west side of Park-avenue alongside the wall of the old tunnel between Fiftieth and Fifty-seventh streets. This excavation was carried down at first only to the bottom of the tunnel, where two new tracks were laid in the excavated area and connected at both ends to the adjacent existing tracks, the construction of the new retaining walls involving the underpinning of adjacent buildings. As the excavation here and on the east side of Park-avenue extended across the entire width of that thoroughfare the foot pavements were supported over the excavation on temporary wooden trestles.

In 1904 work was commenced on the excavation of the east side of Park-avenue from Fiftieth to Fifty-seventh streets, where a trench wide enough for three new tracks was carried down to the final level. This excavation was in rock, dipping so steeply towards the west that it was necessary to build a heavy retaining wall outside and independent of the new tunnel wall, and to provide new footings for most of the buildings.

To provide for cross-overs in the tracks it was necessary to omit some of the columns and to support some of the side roofs in Park-avenue by longitudinal girders and trusses, those between Fifty-sixth and Fifty-seventh streets being 150 ft. long by 10 ft. high.

The walls of the old tunnel were partly removed, the roof was entirely removed, and steel columns to carry the trusses were erected by derricks and temporarily braced. The trusses were then erected on timbers supported by the old tunnel walls, the truss members being assembled by a stiff-leg derrick on top of the old tunnel. The trusses are enclosed by screens of ornamental concrete, and the space between them will be left open for the admission of light and air to the tunnel.

The main excavation was an operation of great magnitude, involving the removal of 3,096,750 cubic yds. of material, about 2,000,000 cubic yds. of which was rock.

The work had to be conducted under very unusual conditions, one of which was the necessity of avoiding the slightest interruption of traffic. When it is remembered that the yard was already much congested and that the excavations required the transport over the tracks of great quantities of material, it will be realised that very skilful planning and arrangement of the work were requisite to prevent the possibility of interference with the regular train services.

Up to October 1 last some 2,500,000 cubic yds. of material had been excavated and removed. For some of the cross streets it became necessary to adopt special methods in order to complete the work by the dates settled in agreement with the New York city authorities. At such points, hoisting engines were employed to raise the excavated material to storage bins at street level, and from these the *débris* was loaded into wagons and carted away, a method which necessarily increased the cost of excavating very considerably in such portions of the work.

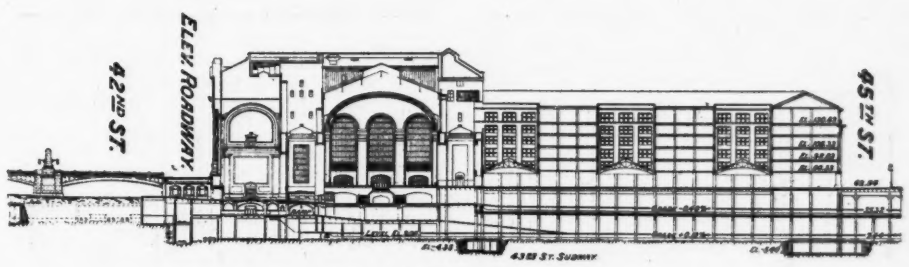
It was originally proposed that traffic should be transferred to the new east side station before it became necessary to remove the old permanent way, but this was prevented by the increase of traffic and the progress of excavation work. Consequently it was decided to remove the old station roof and walls while the through passenger trains of the New York Central line, and the through and suburban trains of the New Haven line continued to use the station.

The demolition of the old station building was carried out in sections, the length at first removed being about 600 ft. long, the roof trusses consisting of wrought-iron arches, the material for which was imported from England and erected in 1870. The arches had the span of 200 ft. 1 in. and a clear headway of 85 ft. from platform level to the underside of the arch. The end of the arches were connected under the tracks by 3-in. diameter tie-rods, and spaced 20 ft. 3½ in apart from centre to centre longitudinally.

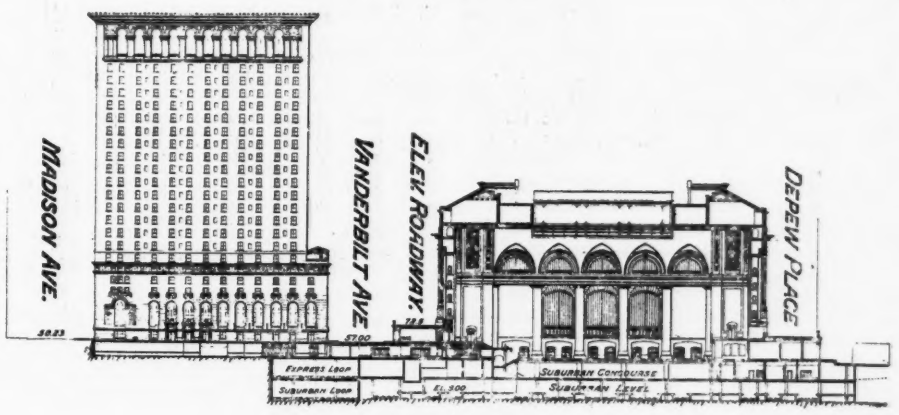
The old building included about 1,350 tons of wrought-iron, 350 tons of cast-iron, 90,000 sq. ft. of corrugated-iron roofing, 60,000 sq. ft. of glass, and 530,000 bricks, all of which were taken down, loaded into cars, and removed from the terminus without interference with traffic.

To accomplish this result and to reduce to a minimum the possibility of accident by falling materials a travelling-stage was erected, the outline of which conformed to the general contour of the roof spanning all the platforms, with heavy floors extending the entire width of the building. The supports for the staging rested on the five intermediate platforms, and were carried on heavy cast wheels which rolled on standard 100-lb. rails. The load on each platform, including the weight of the two arches, was 200 tons, distributed over the entire width of the platform by ties supporting the rail, and covered with temporary planking to prevent interference with the regular use of the platform. Side and end elevations of the staging will be found in Fig. 7.

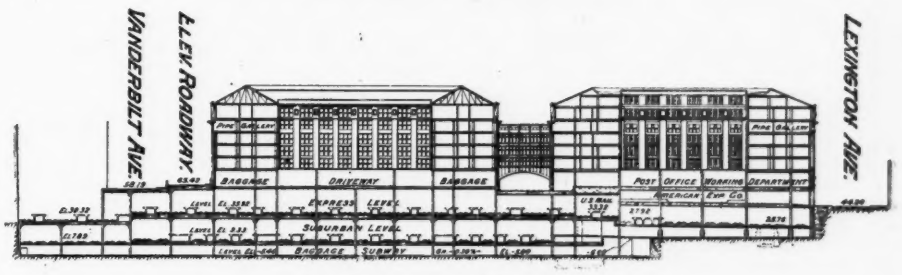
The staging contained 370,000 ft. of timber, 65 tons of bolts and washers, and 33 tons of plates and castings. It had a length of 65 ft., which permitted two of the arches to be carried on it at the same time. It was equipped.



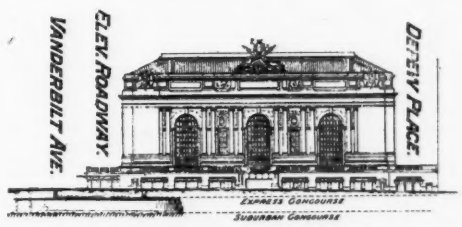
Longitudinal Section.



Cross-Section through Concourse.



Cross-Section through Train-Room.



Forty-second-street Elevation.

Fig. 6. New York Grand Central Station.

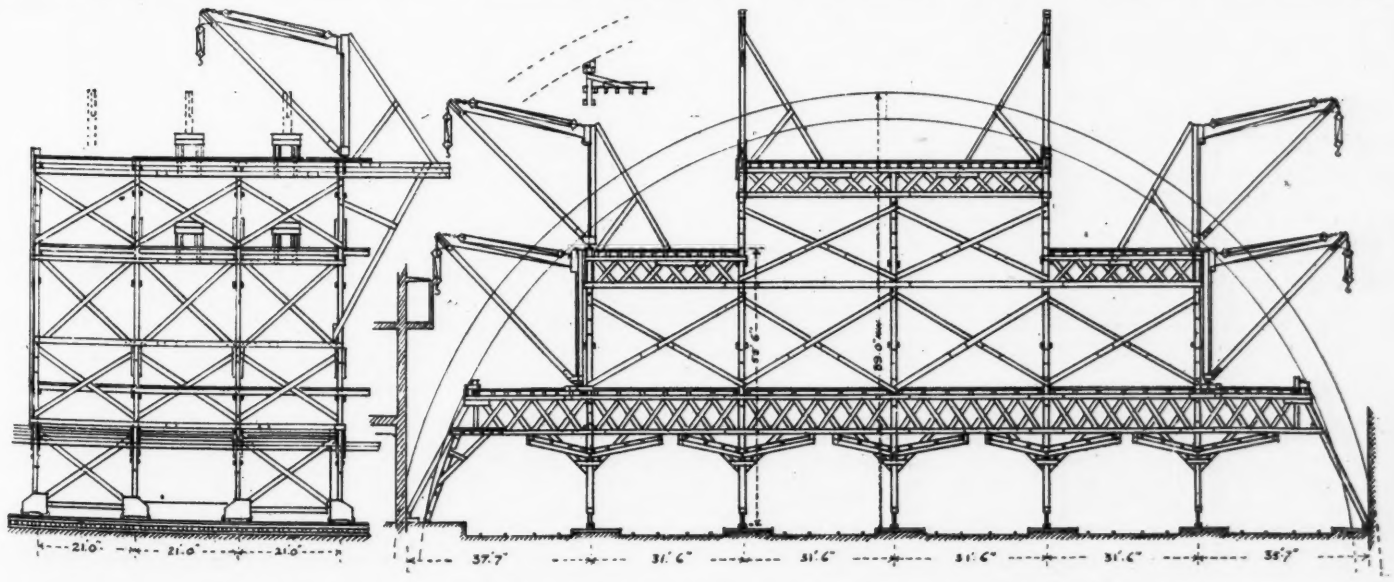


Fig. 7. New York Grand Central Station: Details of Staging for Removal of Old Roof.

with six stiff-leg derricks operated by two engines. Screens were hung at the sides from the first platform level to protect passengers on the outer station platforms. The south face was boarded over, forming a false end for the station as soon as the staging had been moved to the south.

The material was prepared and framed together at the Harlem Works of the company, and portions ready for erection were brought into the station and erected at night up to the first floor level, the remainder being erected during the daytime after the members had been delivered and hoisted to the first floor level at night.

As the staging was moved south it was followed up with temporary wooden canopies, thus reducing exposure to a minimum. As soon as the staging had been moved to a new position two roof arches were blocked on it, and the corrugated-iron roofing, glass, skylights, and purlins were removed. The north of the two arches so supported was then cut into eight sections, which were then placed by derricks on the platforms of the staging, all this work being done during the daytime, while the material was loaded at night into wagons on the passenger tracks under the staging.

The staging was moved by two 15-ton jacks on each platform, each being operated by two men. The work of moving was done in units of 40 ft., and it required at first about five hours and later two hours to move the staging for this distance.

The demolition of the north portal was the most delicate part of the whole operation on account of the necessity for cutting away all connexions between the portal and the main roof before the work of demolition could be commenced. To facilitate this operation the north end of the staging was constructed with beams projecting 5 ft. beyond the face. These beams were passed through the window openings, or through openings out in the metal sheathing, and the entire portal was lashed to the staging. Timber troughs were constructed at the various platform levels so as to prevent loose material from falling on the tracks below.

Conclusion.

The new terminus, which has been under construction for several years, is now approaching completion, and represents an undertaking far greater than the mere building of a large railway-station.

By depressing the tracks below street level and by the substitution of electric for steam traction a space equal to about twenty city blocks has been reclaimed for the erection of new buildings, all of which are to be designed in harmony with the general architectural scheme.

Thus the Grand Central Station reconstruction will not only be the source of a large revenue that will help to pay interest on the enormous outlay undertaken by the railway company, but will also constitute a great civic improvement in the heart of New York.

The works have been designed and executed under the direction of Mr. G. W. Kittredge, Chief Engineer to the New York Central and Hudson River Railroad Company. The buildings were designed by the associated architectural firms of Messrs Warren & Wetmore and Reed & Stem, and the steelwork was designed by Messrs Balcom & Darrow, civil engineers.

TEST DEFLECTIONS IN REINFORCED CONCRETE.

AT the meeting of the Society of Engineers, held on the 2nd inst., Mr. Percy J. Waldram read a paper on "Test Deflections in Reinforced Concrete." The author selected this subject as being one which not only calls for the closer attention of engineers, but which also needs that closer attention without delay, before the proposed London County Council regulations fix a standard of deflection which may or may not be correct, or even safe.

The Relation of Stiffness to Strength.—The stiffness of a beam is no criterion of its strength, unless due regard be paid to the factors of depth and fibre stiffness; but it is not too easy always to appreciate that the fibres of a short deep girder, deflecting under load to, say, $\frac{1}{2}$ in., are possibly being punished much more severely than those of a long shallow girder deflecting, say, 3 in. Still more difficult is it to avoid the drawing of incorrect assumptions from the minute deflections of reinforced concrete beams, because in their case not only are the formulæ for strength very tedious, but the writers of text-books have failed to establish any connexion between them and deflection, and seldom even to show how deflection can be calculated at all.

Small Deflections in Reinforced Concrete Not a Proof of Strength.—When beams of reinforced concrete are tested to, say, one and a half times their working load extremely small deflections are recorded, which are triumphantly quoted as evidence of the enormous strength of the new material, because a steel beam of the same proportions would have deflected very much more under its ordinary working load.

A point which is seldom mentioned, however, is that the deflections are small because the greatest working loads and stresses which we dare to place on reinforced concrete are so very much less than those which we habitually work to in wood or steel.

Reinforced Concrete Weaker than Steel or Fir.—A deflection of, say, $\frac{1}{2}$ in. in an ordinary wood or steel floor beam under a test load might indicate quite a satisfactory factor of safety. The same deflection in a reinforced concrete beam of the same proportions would mean that the structure was on the verge of total collapse.

Reinforced concrete has so many advantages over wood and steel in its great durability, its adaptability, and its simple and monolithic character that there should be no need for its exponents to claim for it the strength of steel or even that of ordinary fir. It is a much weaker material than either, and to pretend to believe otherwise is to court disaster. The safe load on a fir beam can always be trusted to destroy a reinforced concrete beam of the same size unless the latter is heavily reinforced in compression.

It does not require much detailed investigation to appreciate that the fibre stress of 600 lb. per square inch, which is the limit of good concrete in compression in beams, obviously cannot produce deformations comparable with those which result from 11 or 12 cwt. per square inch on timber (quite a light loading) or $7\frac{1}{2}$ tons per square inch on steel.

Of course, concrete beams can be reinforced in compression, but the strength of the concrete surrounding the compressive reinforcement is still the governing factor, and double reinforcement is very uneconomical.

Reinforced concrete has the advantage of being easily formed with fixed ends, encastré edges, and into ribbed floors in which the transverse slabs assist the main beams, and the strength of each part contributes to that of one strong monolithic whole; but even with those advantages the proportions of the parts have to be more generous than would be necessary with wood or steel, and the deflections under test loadings are necessarily far less than we have been accustomed to in those materials.

Deflections of Beams under a Given Stress.—It should be carefully remembered that we can obtain the deflection of a beam of a given depth, span, and material under a given system of loading without troubling about its moment of inertia or its section modulus, or even the amount of the load, provided that we know that the loading is stressing the fibres to a given amount.

The formula expressing this is:—

Deflection $= \Delta = \frac{pfl^2}{Ed}$; p being a constant varying with the type of beam and the method of loading. For girders of uniform section under distributed load p is $\frac{5}{24}$. The term d is either the depth (in symmetrical sections) or (in unsymmetrical sections) twice the distance between the neutral axis and the layer of fibres stressed to the amount f (in pounds per square inch). E is the elastic modulus of the material.

Conversely, in all beams having the same proportion of depth to span any given proportion of deflection to span under the same system of loading must indicate the same fibre stress in material of the same stiffness, whatever may be the size of the beam, the span, or the load.

Reinforced concrete therefore must always be expected to show deflections far less than those to which we are accustomed. Long before it deflects to anything like the extent that wood or steel does it would be time for those conducting the test to look to their own safety.

The London County Council Draft Regulations.—The draft regulations of the London County Council specify certain degrees of deflection which would appear to need careful consideration, and it is hoped that discussion may elicit opinions as to whether they should be altered; and if so to what extent and upon what lines. It is necessary not to lose sight of the fact that these regulations require the approval of the Local Government Board before they can come into force; and that until they are so approved it is the obvious duty of professional men to endeavour by all available means to bring them to a high state of efficiency. Their scope may be nominally limited to special buildings in London alone, but when once adopted they will most certainly be regarded as a standard, and their conditions will be specified in cases where they have no legal status whatever.

The Act of 1909 which authorises their compilation requires the Council, before applying for their approval by the Local Government Board, to give notice to the Surveyors' Institution, the Institution of Civil Engineers, the Royal Institute of British Architects, and the Concrete Institute. Every member of any of these Institutes can therefore approach his Council or the Local Government Board direct, if it should appear to him to be desirable that any of the 160 clauses should be altered.

The regulations in their present form appear to have been carefully compiled from codes already in existence in Europe and America, where reinforced concrete is far more extensively used than in England. At least one of these codes—that of the French Government—was based upon several years of valuable and exhaustive experimental research. It would therefore scarcely be expected that any serious errors of principle would have been generally adopted, and clauses upon which the foreign codes are unanimous, or are in general agreement, ought apparently to be good enough to adopt.

But precisely the same considerations obtained when other codes were drawn up. The natural desire of the codifying authority to be able to show precedents for its regulations is only too favourable to the perpetuation of errors, which acquire fresh status every time they appear. It would therefore certainly seem to be desirable that the Institutions should do all they can to awaken interest in these regulations and secure the greatest possible volume of criticism from their members; so that even if errors of principle may have crept into other codes they shall not be repeated in the first British code.

Early in the present year the author was consulted with reference to a case where the parties had agreed that the regulations as printed in the Council's minutes should be worked to. This opportunity of applying them to the problems of a somewhat complicated design necessitated a close examination of their provisions, and the result was, to say the least, disquieting.

For instance, the clauses determining the strength of columns—based, like the French code and the R.I.B.A. report, on a mistaken application of Euler's formula*—were unworkable; whilst those relating to deflection would appear to be positively dangerous.

Clause 23 allowed beams of a lesser depth than $\frac{1}{24}$ span provided the calculated deflection was less than $\frac{1}{600}$ span—regardless of the fact that even with absolutely free ends the concrete of a beam $\frac{1}{24}$ of the span in depth deflecting $\frac{1}{600}$ l would be stressed to nearly 700 lb. per square inch. Thus:

$$\Delta = \frac{pfl^2}{Ed}, \text{ and when } \Delta = \frac{l}{600} \text{ and } d = \frac{l}{24} \text{ then}$$

$$f = \frac{24 \times E}{5 \times 600 \times 24} = 666 \text{ lb. per square inch.}$$

(E = 2,000,000 lb. per square inch.)

Whilst in beams with fixed ends it meant anything up to 3,330 lb. per square inch. As the clause did not specify whether test or working load was to be calculated for it might have been merely harmlessly unworkable, especially as there was no method specified for calculating the deflection of T and double reinforced beams.

But Clause 143 specified the test by means of which the District Surveyor should determine whether or not suspected work should be condemned as being a deflection of $\frac{1}{600}$ of the span under the full working load. A short deep beam with fixed ends or a thick square slab with four fixed edges was thus to show precisely the

* *Vide Engineering*, April 5, 1912.

same degree of flexibility as a long shallow beam with absolutely free ends.

Of course, this was no test at all. No beam or floor of ordinary proportions could ever show such a degree of deflection; it would simply cease to exist. A beam of only $\frac{1}{15}$ of its span in depth, even with absolutely free ends, whatever its section, is necessarily being deformed, when the deflection reaches $\frac{1}{600}$ of the span, to an extent which can only be consistent with a stress of 1,066 lb. per square inch on the concrete. The depth in the foregoing cases should strictly speaking be 2 in.; but allowance must be made for the concrete in tension, which, although neglected, lowers the neutral axis, so that 2 in. is generally more than the full depth.

No amount of compressive reinforcement can make any difference, because when that degree of deflection is reached the concrete surrounding the compression rods is receiving a stress under which it is liable to spall off and leave the rods denuded and free to buckle. If the beam were deeper or if the ends were fixed, as they are in the great majority of cases, the specified degree of deflection would be still more impossible.

But no beam, however bad or shaky, could be condemned under the clause so long as it showed under test load any less deflection. This and the following clause, which stipulates a 50 per cent. increase on the superimposed load, not only gave an implied official approval of a test deflection which would be highly dangerous to everybody concerned, but it would have effectually defeated its own object by preventing the condemnation of any beam or floor which could just stand about one and a quarter times its calculated load without any factor of safety.

These and other points were submitted to the Council of the Surveyors' Institution, who promptly met and considered them and made representations which at the time of writing are presumably still under consideration.

Suggested Standard of Deflection Under Test Load.—The author's suggestion made with regard to deflection was that the standard should be $\frac{1}{1000}$ l on a beam $\frac{1}{20}$ of the span in depth under the calculated load, with free ends and distributed loading; the effect of any conditions other than those being duly allowed for in each case. This would apparently have been equivalent to about 480 lb. per square inch on the concrete, but would only be reached in a bad beam. Of course, any test which increases only the superimposed load, as stipulated in Clause 144, varies in severity, being lenient on heavy beams and severe on light ones; a 25 per cent. increase on the total calculated load may or not be equivalent to a 50 per cent. increase on the superimposed load, but it is estimated to do so in the average case.

Effect of Ordinary End Fixing Not Yet Fully Determined.—It would obviously be better to have a standard criterion of deflection applicable direct to the fixed ends customary in reinforced concrete beams. But whereas we can predetermine the deflection of reinforced concrete beams with free ends and compare it with actual tests, experimental data are lacking as to the actual effect of the ordinary methods of fixing the ends of such beams; which are, it must be remembered, almost invariably doubly reinforced at the ends to meet the reverse bending moments over the supports, and are therefore of unequal stiffness. The theoretical effect of complete end fixing in a beam of uniform section is to reduce the deflection to $\frac{1}{8}$; but to stipulate for a deflection of $\frac{1}{3000}$ l with fixed ends might be right or it might be wrong. We do not know.

Experiments to determine the point would not be very expensive or difficult, and there is power under the parent Act for the Council to make them. But until the point is determined, at least approximately, it is obviously impossible to legislate on a basis about which we know practically nothing.

Importance of a Correct Standard.—If the standard of stiffness be fixed too high good work will be unjustly condemned; if it is too low bad and dangerous work will receive an undeserved certificate of strength. The minute range of the deflections makes it all the more necessary to fix the standard with the greatest care.

The remainder of the paper deals with the actual calculation of deflection and other matters, especially the comparison of calculated and actual deflections, as to which an interesting series of diagrams is given.

THE CONCRETE INSTITUTE.

THE twenty-ninth ordinary general meeting of the Concrete Institute took place at the offices on the 12th inst., the President, Mr. E. P. Wells, being in the Chair. The discussion on Mr. Theobald's paper on "Bills of Quantities for Reinforced Concrete Work"* was resumed, and the following took part in the discussion: Messrs. E. P. Wells, J.P.; Frederick Kingston, C. C. Workman, Member of Council, Concrete Institute; Moritz Kahn, Percival M. Fraser, John M. Theobald,

A paper was then read by Mr. W. Lawrence Gadd, F.I.C., M.C.I., on "Action of Acids, Oils and Fats upon Concrete." In the course of his remarks the author said:—

With regard to the mineral acids—*e.g.*, hydrochloric, nitric, and sulphuric acids—there is little to be said. Neither cement nor concrete will withstand the action of these acids, which decompose and dissolve the constituents of cement, even in dilute solution. Even a weak acid, like carbonic acid, has a distinct action upon cement, which, suspended in water, can be practically entirely carbonated by passing a current of carbon dioxide into it.

The action of organic acids, such as lactic and butyric acids, formed by the fermentation of milk or butter; tannic acid, occurring in tanning liquors; tartaric and citric acids, and acetic acid in vinegar or stale beer, is not so marked; but it is very probable that the whole of the series of higher fatty acids will be detrimental to concrete.

In most cases the action of the organic acids is confined to a combination with the calcium hydrate liberated when cement or concrete is gauged with water; but, as the organic lime-salt formed has no cohesive strength, the concrete must be deteriorated to a greater or less extent, depending upon the quantity of the acid and on its combining weight.

The tendency of organic acids to combine with carbonate of lime is much less than with hydrate of lime, and it follows that an acid which would be dangerous in contact with green concrete might be perfectly harmless in contact with old or indurated concrete. Thus, stale beer has a distinctly detrimental action upon new work, but once the concrete has indurated by exposure to air for some time, the acid of sour beer has little action upon it.

One of the commonest forms of acid action to which building material is subjected is that of sulphuric acid, derived by oxidation from the sulphurous gases present in the atmosphere of large towns. This is noticeable on Portland stone, of which many buildings in London are constructed. It appears to be less marked on concrete buildings, possibly for the reason that the surface pores of concrete become closed with a deposit of calcium sulphate, which affords protection from further action of the acid.

Lactic acid is produced by the fermentation of milk, brought about by the micro-organism *Bacterium lactis*, and is a possible acid to come in contact with concrete structures in farm buildings.

Concrete vats would appear to be suitable for tanning operations, and the possible action of tannic acid becomes of importance. This acid, of which gallotannic acid (C_{14} H_{10} O_9) may be taken as a type, is again an organic acid which combines with calcium hydrate to form calcium tannate, but as the combining weight of tannic acid is high—sixteen parts by weight combining with only one part of calcium—the probable action is not very serious.

Proposals have of late been made, particularly on the other side of the Atlantic, to incorporate a certain small amount of oil or fat with concrete, with the object of giving the same dustless, waterproof, and other qualities. What we might almost call the natural instinct of the concrete-worker has, however, always led him to avoid oil or grease as far as possible, and he has been right. Whether we accept the crystallisation theory, or the colloidal theory of the setting of cement, the presence of oily matters must interfere with the process of setting, even assuming that the oil has no chemical action with the constituents of the cement. Furthermore, oil does not readily mix with water and has a tendency to collect in globules, which, however small, are a source of weakness to the concrete.

Many oils and fats react chemically with the cement constituents, and in this class must be placed the whole of the oils and fats of animal or vegetable origin.

* See our issue for December 6, p. 690.

These substances consist of the glycerides of various fatty acids, such as stearic, palmitic, and oleic acids, although the acids may be present in the free state, as, for instance, in palm oil, which may contain from 50 per cent. to 80 per cent. of free acids calculated as palmitic acid.

The glycerides of the fatty acids, which constitute the neutral oils and fats of animal or vegetable origin, are readily decomposed, or saponified, by certain metals and metallic salts, and by all alkalies, including calcium hydrate, which we know is a constant product in cement or concrete which has been gauged with water. The result of this saponification is the decomposition of the oil with the formation of a metallic or alkaline salt or soap, and the liberation of glycerin.

Thus, tallow is saponified by calcium hydrate, according to the following equation:—

$$2\ C_3\ H_5\ (C_{18}\ H_{33}\ O_2)_3 + 3\ Ca\ (OH)_2 = 2\ C_3\ H_5\ (OH)_3 + 3\ Ca\ (C_{18}\ H_{33}\ O_2)_2.$$

Tristearin (tallow) + calcium hydrate = glycerin + calcium stearate (lime soap).

Calcium stearate is a whitish, friable material, insoluble in, and immiscible with water; whilst the lime soaps of other fatty acids commonly occurring in oils and fats are slimy and sticky substances which, although water repellents, do not, so far as my experiments show, render concrete less permeable to water, and decidedly reduce the tensile and crushing strength.

By this process of saponification, which takes place rapidly under the influence of heat and more slowly in the cold, cement or concrete will certainly be injured by the admixture of any animal or vegetable oil or fat; and if the concrete be green or new, there is some liability of damage being done to it by mere contact, such as might occur from constant drippings of oil upon it.

Mineral oils and greases, which are hydrocarbons, are of a different constitution from that of the animal and vegetable oils, and are incapable of saponification. They have, therefore, no injurious action from this particular cause, although they weaken the strength of concrete for physical or mechanical reasons.

The vegetable and saponifiable oils cotton-seed and colza are absolutely destructive to concrete, and that the mineral oils, which are not saponifiable, reduce the strength very materially when mixed in small proportion with the mortar. It will be noticed that the strength at twelve months is less than at six months in the cases of cylinder oil (mineral), lard (animal), and colza oil (vegetable).

When testing samples of cement for tensile strength, which is commonly done now by users, I have observed that many operators use colza oil for the purpose of greasing the briquette moulds. The film of oil which remains, or should remain, on the moulds is, of course, very thin, but colza oil cannot be considered a suitable oil for the purpose, seeing that it has so great an action upon cement. Briquette moulds should be oiled with mineral oil, or a mixture of heavy mineral oil and paraffin.

It is to be noted that these slabs were not intended to be made absolutely water-tight, the object being to obtain a comparison. Leighton Buzzard sand was therefore used, and the results show that under identical conditions sand mortar without any addition of oil was more water-tight than with any of the oils or fats tried. The addition of lard, colza, and cotton-seed oils to the extent of less than 2·5 per cent. on the weight of the concrete prevented the slabs from setting properly.

The conclusions I draw from theoretical and experimental data are:—

1. That the addition of oil or fat of any kind to concrete results in a weakening of the strength.
2. That animal and vegetable oils have a direct action on green concrete, and in time will bring about its destruction.
3. That indurated concrete is less liable to be attacked by oils and fats.
4. That oil-mixed concrete is not rendered more waterproof. The least permeable concrete is, in my opinion, a dense mortar in which the aggregate is properly graded to fill the voids."

The following took part in the discussion on this paper:—Messrs. E. P. Wells, J.P.; D. B. Butler, A. Alban H. Scott, R. W. Vawdrey, B.A., Percival M. Fraser, W. G. Perkins, District Surveyor for Holborn; F. Kingston, G. C. Workman, W. Lawrence Gadd.

HEAT LOSSES FROM STEAM PIPES.

In a paper read by Professor Petavel and Dr. Lander before the British Association this year it was stated that experiments under normal conditions showed the loss of heat from 1 in. uncovered steam pipe to be 3 B.Th.U. per square foot per hour per degree of temperature difference. Of this total 15 per cent. was due to radiation, 4 per cent. to conduction, and 81 per cent. to convection.

It was found that the best insulating materials possessed some thirty times the conductivity of air, so that, were it not for their use in reducing convection, pipe coverings would actually increase instead of diminishing the loss of heat. If the insulation was very tightly packed, its efficiency was low owing to the increase in conductivity, while, on the other hand, if packed too loosely a large proportion of the convection would still continue. For this reason it appeared that for each class of insulation a certain density of packing was best.

For slag wool this was found to be one-fourteenth the actual density of the individual fibres. In that case the loss by conduction through the insulation to the air would be raised from 0·1 to 0·4 B.Th.U. per square foot per degree per hour; the loss by convection would be reduced from 3·2 to 0·1 B.Th.U. per square foot per degree per hour, the net loss being thus one-seventh of that with bare piping.

With bare pipes the character of the service had a distinct influence on the loss by radiation. With a good machined surface the loss by radiation was reduced from 15 per cent. to about 7 per cent. of the total loss, and if the piping were polished the radiation loss was still further reduced to about 3 per cent. of the total. The loss by convection was not, however, affected in any way, and, as this was the main proportion of the total loss, very little was to be gained by polishing.

Another factor to be considered was the diameter of the piping. With a small radius the conduction loss varied with the diameter of the pipe. It was, however, found that this increased loss by conduction only became important with pipes of less than ½ in. in diameter. For pipes above 4 in. in diameter the loss was found to become nearly constant at 2 B.Th.U. per square foot per degree per hour irrespective of the diameter.

MANUFACTURE OF WATER-PROOF ARTIFICIAL MARBLE TILES.*

Facings of artificial marble are now very common, even in buildings of comparatively modest pretensions. The trouble is that durability is sometimes sacrificed to appearance, and the slabs are not only not proof against those accidents which will occur in modern buildings through leaky roofs, bursting water-pipes, overflowing bath-tubs, etc., but even hardly resistant to the careful house-cleaner's wet cloth. In the manufacture of slabs suitable for such uses there are required gypsum (plaster of Paris) and the requisite colouring matters—of course, mineral only; as, for instance, graphite (plumbago, black-lead), chrome-green, English red, iron oxide, red, yellow, and brown ochres, and ultramarine, all of which are unaffected by the gypsum or by each other. A separable frame is made, about 2 in. high, of planed ½-in. strips, and divided by a cross strip.

For small "tiles," say 4½ in. by 4½ in., there are needed several glass plates about 8 in. to 12 in. square, and the wooden frames are arranged so as to leave spaces of the size of the glass plates.

A solution of paraffin wax is made in benzine, in the proportions of 30 grammes to a litre (about ¼ lb. to an American gallon). This solution must be kept in a warm room in a tightly-corked bottle, and requires to be shaken at each time of using. One side of the wooden frame and the glass plate is to be well rubbed with the solution, and then dried thoroughly with a clean cloth.

On the work-table there is laid a mirror, face upwards; on this are laid two strips of wood; on the latter the glass plate and on this the mould. To prevent the glass plate from shifting, rubber rings should be laid between it and the wooden strips.

Next the colours are to be mixed. For green and black veining, chrome-green and graphite are used. Each colour is mixed to stiffness with a little water in a separate saucer. In a large vessel the gypsum and water are mixed to the consistency of thick cream. Any bubbles must be removed.

The frame is half filled rapidly with the plaster, and at once a brush dipped in the graphite must be thrust through the mass to the glass, on which the pattern is to be traced—a matter of a few seconds only. The veinings will be seen by reflection in the mirror below. If they are too thick in any one place, they may be lightened with the brush. If the consistency of the plaster and the colour be right, the two will run together properly. Then the green colour is applied in similar manner. In a few minutes the first layer will be hard enough to permit the frame to be filled to the edge with a mixture of sand and gypsum or sand and cement. If the slab is intended to be specially durable, wire gauze or cloth may be laid on the first layer, before the second is poured in, the ends of the wires being bent upwards. In a short time the frame may be removed to hasten the drying of the tiles. These must remain on the glass plates until thoroughly hard and dry, and care must be taken not to slide them on the plates.

The surface obtained is smooth, but not very highly polished, and is somewhat porous. The pores can be closed by amylacetate collodium, which improves the polish and makes the tile waterproof. It resists both acids and alkalies, and the surfaces can be washed with water and chamois leather.

When the tiles are dry they should be slightly warmed and thoroughly waterproofed by immersion in a mixture of the above-named collodium and a third of amylacetate, which will sink in to a depth of about a third of an inch. The tiles are then to be dried in a warm place, and finally painted with undiluted amylacetate collodium.

Greater hardness may be obtained by adding to the gypsum a small quantity of ground pumice-stone or powdered glass, which gives the tiles a grain without damaging their appearance.

* Translated from an article by Fried. Huth.

ENGINEERING NOTES.

The Los Angeles Aqueduct. The great aqueduct now under construction for supplying the city of Los Angeles with water has the unprecedented length of 240 miles, including some 47 miles of tunnels and 193 miles of steel and reinforced concrete pipes. One of the most interesting features of the project is the construction of twenty-two inverted steel siphons for conveying water from the eastern side of the Sierra around the western boundary of the Mojave Desert, beneath the Sierra Madre range, and into the San Fernando Valley. These siphons range in length from 611 to 15,596 ft., and in diameter from 8 ft. 6 in. to 11 ft., the thickness of the metal ranging from ¼ in. to 1⅛ in., according to the pressure. The aggregate length of the steel siphons is 49,576 ft., which, with concrete siphon approaches and siphons composed entirely of reinforced concrete, brings up the length of this class of construction to 63,585 ft. in all. The maximum head varies greatly, the lowest being 50 ft., while that of the siphon crossing the Jawbone Canyon amounts to 850 ft This siphon will have a total length of 5,095 ft., the pipe ranging from 7 ft. 6 in. to 10 ft. in diameter. The longest siphon is that by which the water will be carried across the upper end of the Antelope Valley on the Sierra Madre range. This siphon at its northern end consists of a concrete pipe 10 ft. in diameter, designed for the head of 75 ft.; 15,596 ft. of steel pipe 10 ft. in diameter, constructed for a head of 200 ft.; and 3,414 ft. of 10 ft. diameter concrete pipe at the southern end, for a head of 75 ft. It is hoped that the aqueduct will be completed during the early months of next year, the total cost of the work being about five millions sterling.

The Young Engineer. At a meeting of the Junior Institution of Engineers on the 11th inst. the President, Sir A. Trevor Dawson, delivered an address on "Staff Officers in Industrial Works: Their Scientific and Practical Training and Duties," in the course of which he said that the demand now was for well-trained youths having experience of materials, mechanical methods, and men. Experience was a dominant consideration. This could not be too forcibly emphasised, for young men were at times prone to seek advancement without carefully considering whether that which looked like advancement would conduce to the winning of the experience so invaluable in future work. He was a wise youth who, when he could afford it, accepted experience as part of his remuneration. There was a national need for much more highly-trained engineers—men combining scientific and practical knowledge, and having experience of materials, mechanical methods, and men to serve on the staff of works. The most difficult of all problems which beset the young engineer was the management of men. There were certain occupations in which a man could design and complete his work himself. The painter, the *littérateur*, the musician could labour in solitude, and their products were the fruit of their own brains. But with the staff officer the case was quite different. He had largely to see through other persons' eyes, to hear through their ears, and to act through their hands. The day was not long enough for him to take personal cognisance of everything for which he was responsible. He must act to a great extent through subordinates. When they served him well he got the credit, and when they served him ill he bore the blame. It was therefore of immense importance to him and his firm that he should, in the first place, select his assistants with skill, and, in the second, imbue them with a spirit of loyalty. Nothing conduced more to good service than the knowledge among the rank and file that the chief could take any job out of their hands and do it as well as or better than themselves. Our great technical institutions in the metropolis and provincial cities were not excelled in any country in the world, and it was creditable also that our great City Companies and many private endowments had assisted many less-favoured in the "world's goods" to prosecute their engineering studies at such institutions. Yet the results had proved unsatisfactory, alike from the point of view of the student and the nation. The absence of practical training, of early contact with the workshop, deprived those students in most cases of an indispensable part of their preparation for future industrial work, and interfered with their finding a suitable vocation after their college course had been completed. Was it too much to expect that, as there was great national need, the State should extend its educational system so as to enable the best youth to enter upon a combined practical and theoretical training for the greatest of manufacturing industries, without requiring great sacrifices on the part of parents who might be unable to support their sons throughout the prolonged period of training?

Bridging the Mersey. Mr. L. H. Chase, M.Inst.C.E., lectured on the 18th inst. before the Liverpool Engineering Society on his schemes for bridging the Mersey between Liverpool, Birkenhead, and Seacombe. Instead of making the approaches extend over a distance of 1 mile from each side of the river, Mr. Chase proposes a spiral roadway up which motors and trams would run by their own power to the level of the bridge, some 200 ft. above the high-water level of the River Mersey, and thus clear of such vessels as the *Mauretania*. The spiral roadway was to be built in reinforced concrete, and would look not unlike the Roman Colosseum. The bridge would be of the suspension type and its span of 2,700 ft. would make it the largest span in the world. The main towers would be placed near the Prince's Landing Stage on the Cheshire side, and would be 500 ft. high. The total cost, exclusive of land and legal expenses, was estimated at about 825,000*l*. Mr. Chase also mentioned a new design for dealing with passenger traffic only on a similar bridge.

The Largest Testing Machine in the World. The 10,000,000-lb. testing machine designed by Mr. Tinius Olsen, of Philadelphia, for the Structural Materials Testing Laboratory of the U.S. Geological Survey, at Pittsburg, was shown in operation during the Congress of the International Association for Testing Materials, when a 4-ft. square brick column, 12 ft. high, was tested to destruction under a load of 6,580,000 lb. The machine was designed to test 60-ft. columns vertically, and it can also be applied for testing slabs and beams of large dimensions. As at present erected, however, the machine is not available for testing columns more than 25 ft. in length.

THE BUILDING TRADE.

THE TRADE UNION BILL.—III.

IN our last notice of the proceedings in Committee relating to this Bill we referred to the amendment, which was lost, that the rules provided by Clause 3 should be of statutory force so that if they were infringed some remedy might be given to members to secure the observance of the rules. The clause, as it stands, affords the minority little protection, as we showed in our article of November 15.

A number of sittings have been occupied with the discussion of the subclauses to this clause. By subclause (*a*) the funds of a union are only to be applied to such political objects as are approved by a resolution passed on a ballot of the members "by a majority of the members voting." It has always been contended that this subclause does not provide for the real expression of the opinion of the members of a union, and amendments were moved providing (1) that the political objects must be approved by a majority of the members of the union, or (2) that at least two-thirds of the members living in the United Kingdom must vote on the resolution. Both these amendments were rejected after some considerable discussion. If the political objects to which the funds are to be devoted can be determined as the Bill now stands, by a majority of the members voting, the exemption of those who are unwilling to contribute becomes increasingly important, but all amendments to subclause (*c*) were negatived, and the clause stands as in the Bill. According to this clause members not wishing to contribute to the political objects are to be placed under no disability, but, as we have shown in our previous articles, if a man is placed under any disability no remedy is open to him. Subclause (2) of Clause 3 defines the political objects. This clause was passed, save that words were reintroduced including the maintenance of Members of Parliament. These words were in the Bill when it was introduced last year, but were omitted when payment was granted to Members of Parliament. It was suggested that this might not be a permanent condition, as the State payment of Members of Parliament was only granted by a clause in the Budget, and was therefore subject to review at the end of the financial year, thus the words were reinstated. Clause 4 deals with the ballot which has to be taken in accordance with any rules made by the union for the purpose, but the Registrar of Friendly Societies shall not approve any rules unless he is satisfied that every member has an equal right of voting, and that the secrecy of the ballot is properly secured. On the motion of the Attorney-General a provision was conditionally inserted that every member should have, "if reasonably possible, a fair opportunity of voting."

Clause 5, which requires a circular to be sent to the members of a union on the passing of a resolution adopting political objects, acquainting them with their right to exemption from contribution, was amended on the motion of the Attorney-General, substituting for the circular "notice" to be given, the latter part of the clause being redrafted. It will be seen that the Bill leaves the Committee (for they have concluded their labours) very much in its original form and, if anything, less favourable to the rights of minorities.

We have shown that the Bill affords no real protection to those who, compelled to join a union in order to obtain work, do not wish to forward the political propaganda selected by a bare majority; the rules inserted by way of protection are a dead letter since there is no appeal to the Courts or elsewhere, the ballot is unsatisfactory, and the position of those who notify the union that they decline to contribute to the political objects is very precarious.

The only real concession made in the interest of the dissentient minority in the unions was a promise made by the Attorney-General that he would consider whether the Registrar of Friendly Societies should be empowered to settle disputes between members of a union about small sums.

Apart from the effect the Bill may have upon the unions and their members, there remains a question of the greatest interest to the public, especially since the recent decision in the House of Lords in Vacher's case (see the *Builder*, November 29 last). The Trades Disputes Act enables a trade union to commit any tort against the public or anyone else without being held liable in any court of law. Is this immunity to be extended to their political powers and activities? Are the public to be placed entirely at the mercy of the unions at election times, with no civil redress for head-smashing, window-smashing, defamation of character, or any other tortious act? A new clause, confining the protection of sect. 4 to the existing powers of trade unions was rejected by the Committee without a division, and the public are to be left without redress.

EDINBURGH, LEITH, AND DISTRICT BUILDING TRADES ASSOCIATION.

IN Ferguson & Forrester's Restaurant, Princes-street, on the 11th inst., the annual dinner of the Edinburgh, Leith, and District Building Trades Association was held. Ex-Bailie Forrest presided.

Mr. Malcolm Stewart, of the Glasgow and West of Scotland Building Trades Council, proposed the toast of the Association.

The Chairman, in reply, said their relations with the employees during the year had been harmonious and cordial. Referring to the Insurance Act, which he characterised as a source of annoyance and irritation all round, the Chairman said that as it had become law it was their duty to make the Act work as smoothly as possible. They had passed through a prolonged depression of trade, and they naturally were asking the reason of the long-continued depression. He personally was convinced that recent legislation had done the greatest part of the damage. No trade had been so heavily hit as theirs. Confidence in heritable property had been destroyed, but he was convinced that they were round the corner. No houses were being built, but the population must be increasing to some extent. There had been a considerable amount of contract work in the city during the year, and with increased trade that work should be more plentiful.

Mr. A. D. Angus proposed "The Corporations of Edinburgh and Leith," and said that builders could not keep in too close touch with those bodies.

Councillor Cameron said a great industry like that which they stood for ought to be directly represented in the Council.

Bailie Pennell, Leith, also replied.

GOVERNMENT CONTRACTS.

THE following tenders have been accepted during the past month by the Government Departments named:—*Admiralty, Works Department:* Portland cement for Peterhead Harbour of Refuge Works—Wouldham Cement Company, 35, Great St. Helen's, E.C.; works services: redrainage of and erection of sewage lift tower at Fort Cumberland, R.M. Barracks, Eastney—Mr. S. Salter, Yorke-street, Southsea; shed for loaded powder trucks, H.M. Dockyard, Chatham—Messrs. West Brothers, Rochester. *War Office:* Works services: alterations to boundary wall, etc., Duke of York's Headquarters, Chelsea—Messrs. Bovis, Ltd., Upper Berkeley-street, W.; erection of abattoir, Curragh Camp—Mr. J. Murphy, Ardville, Blackrock-road, Cork; erection of barrack block, Hilsea—South-Western Building and Steam Joinery Company, Ltd., Gosport; erection of officers' quarters, Quebec Barracks, Bordon—Messrs. Martin, Wells, & Co., Ltd., Victoria-road, Aldershot; erection of sanitary annexes to married quarters at Birr—Mr. J. Hickey, Birr; erection of sanitary annexes to married quarters at Northampton—Messrs. E. Archer & Sons, Ltd., Northampton; erection of sanitary annexes to married quarters at Paisley—Messrs. J. Paterson & Sons, Ltd., 610, Pollokshaws-road, Glasgow; erection of small arms ammuntion store, shelter sheds, etc., Rainham Rifle Range—Messrs. Pavitt Brothers, Aveley, Purfleet; installation of electric light, etc., Old College, Sandhurst—Mr. V. G. Middleton, Broadway-chambers, Westminster, S.W.; installation of heating apparatus at New Cavalry Barracks, Redford—Messrs. E. Deane & Beal, Ltd., 3, Monument-street, E.C.; Old College, Sandhurst—Messrs. E. Deane & Beal, Ltd., 3, Monument-street, E.C.; School of Aviation, Salisbury Plain—Messrs. Strode & Co., 48, Osnaburgh-street, N.W.; overhead conductors and supports for electricity supply, Tidworth and Bulford—British Insulated and Helsby Cables, Ltd., Prescot, Lancs; provision of gymnasium, forage barn, etc., Horfield Barracks, Bristol—Messrs. E. Walters & Son, St. Andrew's-road, Montpelier, Bristol; repairs and maintenance of War Department buildings at Lichfield—Messrs. T. Lowe & Sons, Curzon-street, Burton-on-Trent; Netley—Mr. H. G. Ross, Station-road, Netley; Purfleet—Messrs. Pavitt Brothers, Aveley, Purfleet; Warrington—Mr. J. P. Booth, 8, Forrest-street, Warrington; revision of foul drainage, Sheerness—Messrs. T. Wood & Sons, Ltd., Crockenhill, Swanley; supply and erection of cooking apparatus, Old College, Sandhurst—Falkirk Iron Company, Ltd., Craven House, Kingsway, W.C. *Crown Agents for the Colonies:* Steel bridgework—Messrs. J. Butler & Co., Ltd., Stanningley Ironworks, near Leeds; Horsehay Company, Ltd., Tipton, Staffs; cement—Associated Portland Cement Manufacturers, Ltd., 8, Lloyds-avenue, E.C.; British Portland Cement Manufacturers, Ltd., 4, Lloyds-avenue, E.C.; Messrs. Martin, Earle, & Co., Ltd., 139, Queen Victoria-street, E.C.; Wouldham Cement Company, Ltd., 35, Great St. Helens, E.C.; sanitary pails—Messrs. George Jennings, Ltd., Lambeth Palace-road, S.E. *Office of Works:* Builders' work; erection of ballroom, Cairo Consulate—Messrs. Cossena & Biriotti, Cairo; new post-office, Dover—Messrs. Ellis Brothers, New Romney, Kent; erection of Edinburgh Labour Exchange—Messrs. H. Millar & Sons, Millar-place, Edinburgh; extension of Grimsby Telephone Exchange—Mr. P. T. Kettlewell, 60, Trinity-street, Hull; extension of women's cloakroom, Hampton Court Palace—Messrs. Pasterfield & English, 27, High-street, Collier's Wood, S.W.; alterations, Leicester Inland Revenue Office—Messrs. H. Herbert & Sons, 33, Millstone-lane, Leicester; erection of new telephone exchange, Purley—Messrs. H. & G. Taylor, Hayes-lane, Beckenham; alterations, Reading Labour Exchange—Messrs. Allaway & Co., 115, Oxford-street, Reading; ordinary works and repairs at Smethwick—Messrs. J. Barnsley & Sons, 102, Ryland-street, Birmingham. *General Post Office:* Laying lines of pipes, Edinburgh—Mr. T. Spence, 13, Cathcart-place, Edinburgh; laying lines of Sykes' ducts, London-Canterbury (sect. 3)—Mr. W. Dobson, Yeaman-lane, Dundee-street, Edinburgh; London-Coventry-Birmingham (sect. 5)—Mr. W. Dobson, Yeaman-lane, Dundee-street, Edinburgh; laying lines of Sykes' ducts and pipes, London-Weybridge-Guildford (sect. 2)—Messrs. Greig & Matthews, 35, Queen Victoria-street, E.C.; Coulsdon-Redhill-London—Messrs. Greig & Matthews, 35, Queen Victoria-street, E.C.; Finchley-Barnet (sect. 2)—Messrs. Greig & Matthews, 35, Queen Victoria-street, E.C.; Dundee—Mr. David Horsburgh, 65, Trades-lane, Dundee; laying lines of ducts, Bishopsgate-street, E.C.—Messrs. Airds, Ltd., 22, Queen Anne's-gate, S.W. *Metropolitan Police:* Erection of a new police-station at South Fulham—Messrs. J. Garlick, Ltd., 43, Sloane-street S.W.; erection of a new police-station at Tottenham—Mr. G. R. Rowley, 278, Philip-lane, West Green, Tottenham; general repairs at Metropolitan Police buildings—Messrs. Holland & Hannen, Hyde-street, Bloomsbury, W.C. *Commissioners of Public Works, Ireland:* Building works: erection of Blackluin National School, Co. Kerry—Mr. P. T. Kennedy, Moyderwell Tralee, Co. Kerry; alterations to mechanical engineering laboratory, Royal College of Science, and erection of new public offices, Upper Merrion-street, Dublin — Messrs. McLaughlin & Harvey, Ltd., Dartmouth-road, Dublin; erection of St. Joseph's, Killasser, National School, Co. Mayo—Mr. W. Killacky, Kiltimagh, Co. Mayo; erection of St. Patrick's, Coagh, National School, Co. Tyrone—Messrs. Currie Brothers, Castlecaulfied, Co. Tyrone.

COUNCIL SCHOOL, NEWBOTTLE.

A new County Council school has been erected at Newbottle at a cost of about 2,984*l.* from the designs of Mr. Rushworth, the County Architect. The building provides accommodation for 260 boys, and the work was executed by Mr. White, contractor, of Sunderland.

GENERAL BUILDING NEWS.

DRILL HALL, PERTH.

Mr. G. P. K. Young, A.R.I.B.A., is the architect for the new Territorial drill hall which has been erected in Perth. The new buildings have been erected as additions to the old Volunteer drill hall in Tay-street, and include lecture, recreation, officers', and general rooms. The contractors were:—Masons, Messrs. Beat Brothers, Perth; joiners, Messrs. D. S. & J. Anderson, Perth; plumbers, Messrs. Frew & Co., Perth; plasterer, Mr. D. M'Nair, Falkirk; slaters, Messrs. J. Buchan & Son, Perth; glaziers, Messrs. J. Coutts & Co., Edinburgh; steelwork, Mr. D. M'Gregor, Perth; heating, Messrs. Taylor & Fraser, Glasgow; and painter-work, Mr. H. MacKay, Perth.

NEW JETTY AT TILBURY.

The Port of London Authority has accepted the tender of Messrs. Perry & Co., amounting to 105,466*l*., for constructing a deep-water river-side jetty at Tilbury. The jetty will be 1,000 ft. long and 50 ft. wide, will have railway connexions, and be equipped with the most modern type of cranes for the rapid handling of cargo.

NEW HOSPITAL, CLAPHAM.

It is stated that an anonymous gift of 25,000*l*. has been made for hospital purposes in London, including a site at Clapham Common, and it is proposed to erect a hospital for women there at the cost of 25,000*l*.

CHURCH OF THE ANNUNCIATION, W.

The name of the builder of this church, illustrated in our issue of December 13, was given as Mr. F. T. Chinchen, of Kensal Green; this should have been Messrs. Chinchen & Co., of the same address.

TRADE NEWS.

The Cherry Tree Machine Company, Ltd., laundry engineers, Blackburn, inform us that they have in hand, for the Western Hospital of the Metropolitan Asylums Board, the contract for the supply of two new "Manchester" metal-washing machines of 350 shirt capacity each, with elevated back gearing, and cage divided in two compartments; the same contract also includes one of their 108-in. by 24-in. "Manchester" Decoudun ironing machines, with two-speed gearing, automatic safety finger guard, etc.

Ronuk, Ltd., the proprietors of Ronuk sanitary polish, have received a Royal Warrant of Appointment to her Majesty Queen Alexandra.

Under the direction of Mr. George H. Farley, architect, Banbury, the "Boyle" system of ventilation (natural), embracing Boyle's latest patent "air-pump" ventilators and air-inlets, has been applied to the Wesleyan Chapel, Grimsbury.

Messrs. E. H. Shorland & Brother, Ltd., of Failsworth, Manchester, have received repeat order to supply their double-fronted patent Manchester stoves with descending smoke flues to the Napier Hospital, New Zealand.

APPLICATIONS UNDER LONDON BUILDING ACTS, 1894 to 1909.

AT the last meeting of the London County Council the following applications under the London Building Act were dealt with. (The names of the applicants are given in parentheses):—

Width of Way.

Finsbury, East. — Buildings upon a site abutting upon Dingley-road and Nelson-passage, Finsbury, with a portion of such building next to Nelson-passage upon land not previously built upon and at less than the prescribed distance from the centre of such passage (Messrs. Yetts, Sturdy, & Usher for Messrs. T. Wallis & Co., Ltd.).—Refused.

Greenwich.—One-story building on the northern side of Wood Wharf, Greenwich (the London Electric Supply Corporation, Ltd.).—Consent.

Southwark, West.—Erection of a building on the southern side of Friar-street, Southwark (Mr. J. F. Wetherell).—Consent.

Westminster. — Re-erection of No. 69, Catherine-street and No. 6, Wilfred-street, Westminster (Mr. G. J. Cawthorne for Miss J. Beckley).—Consent.

Width of Way and Lines of Frontage.

Paddington, North.—Projecting steps at No. 9, Blomfield-mews, Paddington (Messrs. Norman & Burt).—Consent.

St. George, Hanover-square. — Projecting illuminated sign at No. 5, Mill-street, Hanover-square (Messrs. Freeman & Co. for the Bodega Company, Ltd.).—Consent.

Width of Way and Construction.

Deptford.—Temporary wood and iron building on land abutting upon Trundley's-road, Deptford (Mr. B. Cloke).—Refused.

Kensington, North.—Erection of a temporary steel and iron building on the eastern side of Old Court-place, Kensington (Messrs. J. Barker & Co., Ltd.).—Consent.

Limehouse.—Wood and iron building on the western side of Carr-street, Limehouse, in front of railway arch No. 640 (Messrs. A. Hapson & Co.).—Consent.

Paddington, South.—Temporary wood and iron covered way at the rear of Nos. 40, 42, and 44, Westbourne-grove, Paddington (Mr. W. Hanney).—Consent.

Lines of Frontage and Space at Rear.

Paddington, South.—One-story building at the rear of No. 154, Westbourne-grove, Paddington (Mr. G. A. Sexton for Mr. A. Woollard).—Consent.

Formation of Streets.

Greenwich.—Formation or laying-out of a new street for carriage traffic between Airy-street and South-crescent, Greenwich, in connexion with the erection of houses (Mr. J. S. Gilbert for the Governors of the Roan School Foundation).—Consent.

Kensington, North.—Formation or laying out of a new street for carriage traffic to lead from Dalgarno-gardens to Barlby-road, Kensington, and a new street to lead from such proposed street to Highlever-road (Messrs. P. & H. W. Currey).—Consent.

Newington, West.—Formation or laying out of a new street for carriage traffic in continuation of Ambergate-street, Kennington (Messrs. Briant & Son).—Refused.

Wandsworth.—Three proposed new streets for carriage traffic upon a site on the eastern side of Valley-road, Streatham (Messrs. I'Anson & Son).—Consent.

Wandsworth.—Retention of barriers across Broadwater-road and Khama-street, Garratt-lane, Tooting (Messrs. Grundy, Izod, & Co.).—Consent.

Wandsworth.—Formation or laying-out of a new street for carriage traffic to lead from Garratt-lane to Steerforth-street, Wandsworth (Mr. J. Wise).—Consent.

PROJECTED NEW BUILDINGS IN THE PROVINCES.*

ABERGAVENNY. — Eisteddfod Pavilion (1,295*l*.); Mr. B. J. Francis, architect, Linden House, Abergavenny; Messrs. Foster & Hill, builders, Abergavenny.

Accrington.—Weaving shed at technical school (2,000*l*.); Mr. H. Littler, architect, 16, Ribblesdale-place, Preston.

Airdrie.—Proposed extension of County Buildings; Mr. James Rennie, County Surveyor, Sandyhill, Shettleston, N.B.

Alloa.—Extensions to bakery, Mar-place (1,500*l*.), for the Alloa Co-operative Society.

Altrincham.—Hospital; Mr. F. B. Dunkerley, architect, 17, St. Anne's-square, Manchester.

Arbroath.—Proposed public baths (7,000*l*.); Mr. P. C. Smith, Surveyor, Burgh Hall, Arbroath.

Ashton-upon-Mersey.—Conveniences, shelter, etc.; Mr. A. Cardingley, builder, Mersey-road, Ashton.

Barnard Castle.—Hall and rifle range; Messrs. Wright & Chapman, architects, 38, Grainger-street, Newcastle; Messrs. Wilson & Sons, builders, 1, Victoria-street, Barnard Castle.

Barnstaple.—Swimming-bath (3,000*l*.); Mr. E. Y. Saunders, Surveyor, Town Hall, Barnstaple.

Bearpark (Durham). — School (3,000*l*.); Messrs. Clark & Moscrop, architects, Feethams, Darlington; Mr. R. Southern, builder, Dipton, Durham.

Benfieldside.—Picture hall (3,000*l*.); Mr. J. Eltringham, architect, Derwent-street, Blackhill.

Berwick.—Proposed remodelling of workhouse (8,900*l*.); Mr. H. R. Peters, Clerk, Guardians' Offices, Berwick.

Bingley.—Theatre (3,000*l*.); Messrs. J. B. Bailey & Son, architects, Scott-street, Keighley.

Bishop Auckland.—Hospital, Tindale-crescent (3,200*l*.); Mr. R. B. Thompson, architect, Market-place, Bishop Auckland; Messrs. Hope & Son, builders, Coundon, Bishop Auckland. Additions at Board's Hospital, Helmington-row (3,000*l*.); Mr. R. B. Thompson, architect, Market-place, Bishop Auckland; Mr. T. Manners, builder, Peel-street, Bishop Auckland.

Blackpool.—School, Devonshire-road District; Mr. F. G. Plant, Education Offices, Blackpool. Wesleyan Sunday-schools (2,750*l*.); Messrs. W. E. Potts, Son, & Hennings, architects, Victoria-street, Manchester.

Blackwood.—Hall; Messrs. H. & D. Barclay, architects, 245, St. Vincent-street, Glasgow.

Bolton.—Central hall for Lancs Miners' Federation (6,000*l*.); Messrs. Bradshaw & Gass, architects, 19, Silverwell-street, Bolton.

Botwell.—Factory for Sandow's Cocoa and Chocolate Company, Ltd., Elephant and Castle, S.E.

Bournemouth.—Additions to printing works for the Richmond-hill Printing Works Company, Ltd.

Bovey Tracey.—Sanatorium, Hawkmoor Estate; Mr. E. H. Harbottle, County Architect, Exeter.

Bridlington.—Residence (1,950*l*.); Messrs. W. J. Walker & Son, builders, Lowgate, Hull.

Brighton.—Proposed alterations to old workhouse and new infirmaries (1,710*l*.); Mr. B. Burfield, Clerk, Guardians' Offices, Brighton.

Bromsgrove.—Proposed children's home; Mr. H. D. Holloway, Clerk, Guardians' Offices, Bromsgrove.

Burnley.—Additions at Town Hall; Mr. G. H. Pickles, Engineer, Town Hall, Burnley. Schools, Padiham-lane (8,000*l*.) and Burnley-lane (8,000*l*.); Mr. H. Littler, architect, 16, Ribblesdale-place, Preston.

Burton-on-Trent.—Children's home, near Belvedere-road; Mr. C. F. Chamberlain, Guardians' Offices, Burton.

Bury.—Police courts, stations, etc., Tenterden-street (about 15,000*l*.); Mr. W. H. Schofield, Surveyor, County Offices, Preston.

Byers Green.—School (5,000*l*.); Mr. H. A. Curry, architect, 3, Biggmarket, Newcastle; Mr. T. Douglas, builder, Close House, Bishop Auckland.

Cannop (near Speechhouse).—Proposed 100 houses; Mr. P. Phipps, Rural District Council Offices, West Dean.

Chard.—Isolation hospital; Mr. C. O. Baines, Surveyor, Urban District Council Offices, Paignton.

Church Gresley.—Drill hall for the Derbyshire Territorial Association.

Cimla.—Proposed conversion of infectious diseases hospital into sanatorium; Mr. W. E. C. Thomas, Surveyor, Rural District Council Offices, Neath.

Clayton-le-Moors. — Church, Atlas-street; Vicar, St. James's Church, Clayton.

Colwyn Bay.—Additions to Royal Hotel for Messrs. Worthington & Co., Ltd., brewers, Burton-on-Trent. Proposed shelters and conveniences; Mr. W. Jones, Surveyor, Urban District Council Offices, Colwyn Bay.

Cottingham (Hull).—Picture theatre, Hallgate; Mr. J. H. Wright, Hallgate, Cottingham.

Coupar Angus.—Garage, Union-street, for Messrs. C. Gardiner & Co.

Croyde.—Proposed drill hall for the Croyde and Georgeham Territorials.

Denny.—Proposed library; Mr. A. G. Merriles, Surveyor, Town Hall, Denny.

Devonport.—Municipal buildings (70,000*l*.); Mr. J. F. Burns, Surveyor, Town Hall, Devonport.

Dinnington.—Additions to Wesleyan Methodist Church for the Trustees.

Drumblade.—Cookery, laundry, and manual work buildings; Mr. W. L. Duncan, Hall Hill House, Turiff.

Dukinfield.—Church school, King-street; Vicar, St. Luke's Church, Dukinfield.

Dundee.—Alterations to premises, West Henderson's Wynd., for Messrs. A. Thomson & Sons, wastepaper merchants.

East Cowes.—Additions to premises, for Messrs. S. E. Saunders & Co., motor-boat builders.

Facit.—Weaving shed for the Spodden Manufacturing Company, Ltd., cotton goods manufacturers, Spodden Mill, Facit.

Foggintor.—School, between Merrivale and Rundlestone-cross; Mr. P. Morris, architect, 1, Richmond-road, Exeter.

Ford.—Tuberculosis pavilion and alterations and additions to isolation hospital (7,978*l*.); Messrs. J. & T. Parker, builders, Commercial-road, Sunderland.

Gee Cross (Hyde).—Additions to works, Wych Fold, for the Werneth Rubber Company, Ltd., indiarubber goods manufacturers.

Glasgow.—Two houses, Springburn-road, Bishopsbriggs; Mr. W. Nimmo, builder, Netherhall, Bishopsbriggs, Glasgow.

* See also our list of Competitions, Contracts etc., in another page.

Great Yarmouth.—Plans have been passed for four houses in Victoria-street for Mr. F. Grimble, and for four houses in Suffield-road, Gorleston, for Mr. R. G. Wales.

Griff.—Engine-house (673*l.*); Messrs. G. E. & W. Wincott, builders, 12, Church-street, Nuneaton.

Hatherden.—Ten Houses; Messrs. Beale & Sons, builders, 1, London-street, Andover.

Heywood.—Additions at Perseverance Mill for the Haywood Cotton Spinning Company, Ltd.

Hindolvestone (Norfolk).—Church (1,590*l.*); Mr. H. J. Green, architect, 31, Castle-meadow, Norwich.

Horsham.—Two schools, New-street; Architect, West Sussex Education Offices, Horsham.

Hunstanton.—Shelters on esplanade (720*l.*); Mr. F. Southgate, builder, Hunstanton. Offices; Mr. J. C. Walker, Surveyor, Town Hall, Hunstanton.

Hyde.—Additions to mill for Messrs. Jacobson, Welch, & Co., wholesale stationers, Newton Mill, Hyde.

Hyde (Lancs).—Extensions to public baths; Messrs. Hall Construction Company, Ltd., builders, Salford.

Keighley.—Cinematograph theatre; Messrs. J. B. Bailey & Son, architects, Scott-street, Keighley. Additions to technical institute (12,050*l.*); Messrs. W. H. & A. Sugden, architects, Devonshire-buildings, North-street, Keighley; Mr. J. Warton, builders, Ingrow, Keighley. Swimming-baths (7,000*l.*); Messrs. J. B. Bailey & Son, architects, Scott-street, Keighley; Messrs. P. Rhodes & Co., builders, Skinner-lane, Leeds.

King's Lynn.—Additions to iron foundry, Wisbech-road, for the Cooper Roller Bearing Company. Swimming-baths; Mr. A. Smith, Surveyor, Town Hall, King's Lynn.

Kingston-on-Thames.—Congregational church (4,000*l.*); Mr. E. Carter, architect, 86, Eden-street, Kingston.

Kirkconnel.—Enlargement of school (3,550*l.*) for the Kirkconnel School Board.

Leigh (Lancs).—Weaving shed for the Leigh Mill Manufacturing Company, Ltd., cotton goods manufacturers, 226A, Chapel-street. Mill for Messrs. Taylor & Sons, cotton goods manufacturers; Messrs. Bradshaw & Gass, architects, 19, Silverwell-street, Bolton. Free Methodist Church, Wigan-road (3,000*l.*); Mr. W. H. Dinsley, architect, 12, Cleveland-street, Chorley.

Leith.—United Free Church hall; Mr. G. Craig, architect, 85, Duke-street, Leith.

Lincoln.—Proposed abattoir buildings; Mr. R. A. MacBrair, Surveyor, Town Hall, Lincoln. Infirmary (20,000*l.*); Mr. W. B. Danby, Clerk, Guardians' Offices, Lincoln.

Maldon.—Proposed sixteen houses (2,925*l.*); Mr. T. R. Swales, Surveyor, Town Hall, Maldon.

Melksham.—Picture theatre (1,990*l.*); Messrs. Bigwood & Co., builders, Spa-road, Melksham.

Newcastle-on-Tyne.—Proposed extensions to Rutherford Technical College (10,000*l.*); Mr. A. C. Coffin, Education Offices, Newcastle. Picture hall, Heaton (3,000*l.*); Mr. B. G. Willis, 4, Lansdowne-gardens, Newcastle. Picture hall; Messrs. Hope & Tasker, architects, Trinity-buildings, Newcastle.

Newport (Mon). — Schools for defective children (4,000*l.*); Mr. A. Bain, Architect, Shire Hall, Newport.

Newton-on-Ayr.—Refrigerating factory and plant (4,000*l.*); Mr. F. St. Clair Williams, architect, Sandgate-street, Ayr.

Newtown.—Tuberculosis hospital; Mr. A. G. Parker, Architect, Town Hall, Worcester.

Northwich.—Baths (9,580*l.*); Messrs. Rice & Sons, builders, 15, Stockwell-road, S.W.

Norfolk.—Alterations and additions to Didlington Hall (25,000*l.*); Messrs. Dunn & Watson, architects, 35, Lincoln's Inn-fields, W.C.; Messrs. Holland & Hannen, builders, Gray's Inn-road, W.C.

Norwich.—Additions to East Anglican Institute for Blind and Deaf Children (2,175*l.*), for the Governors.

Nottingham.—Proposed rebuilding of works, Stamford-street, for Messrs. J. M. Perry & Co., Ltd., apron and pinafore manufacturers.

Nuneaton.—Additions to factory, Meadow-street, for Messrs. Hall & Phillips, hat manufacturers.

Odiham.—Proposed almshouses, Broad Oak (3,000*l.*); Trustees of the late Miss Sarah White, Broad Oak, Odiham.

Okehampton.—Territorial drill hall (2,000*l.*); Messrs. Ellis, Son, & Bowden, architects, Bedford-circus, Exeter.

Ongar.—Alterations at workhouse; Mr. A. Richardson, Clerk, Guardians' Offices, High Ongar.

Oulton.—Enlargement of school (150 extra places); Mr. J. Stuart, Architect, County Hall, Wakefield.

Pitminster.—Proposed school; Mr. C. H. Bothamley, Architect, County Education Offices, Weston-super-Mare.

Pontypool.—Theatre and Hippodrome (over 1,000 places) for Mr. G. H. Pitt.

Rainham (Kent).—Cement factory; Mr. P. L. Spoor, Rede-court, near Rochester.

Ramsbottom.—Additions to weaving shed for the Chatterton Weaving Company, Ltd.

Ramsgate. — Proposed shelter, Italian-gardens, West Cliff; Mr. G. Taylor, Surveyor, Town Hall, Ramsgate.

Rotherham.—Congregational church, Kimberworth-road (2,600*l.*); Mr. J. Totty, architect, 20, Moorgate-street, Rotherham.

Scarborough.—Alterations and additions to school (1,535*l.*); Mr. W. Ascough, Education Offices, Scarborough.

Sedgefield.—Hospital; Mr. J. Stones, Surveyor, Council Offices, Sedgefield.

Skelton-in-Cleveland.—Drill hall; Mr. W. Wardman, architect, High-street, Redcar; Mr. M. Franc, builder, 3, Balmoral-terrace, Redcar.

Slough.—Additions to factory for Horlick's Malted Milk Company, Ltd., infants' food, etc., manufacturers.

South Molton.—Artisans' dwellings; Mr. E. D. Grove, Surveyor, Town Hall, South Molton.

South Shields.—Picture hall; Messrs. J. H. Morton & Sons, architects, North-eastern Bank-chambers, South Shields.

Stafford.—Proposed sixty houses; Mr. W. Plant, Engineer, Town Hall, Stafford.

Stirling.—Home (2,500*l.*); Mr. John Allan, architect, 32, Dumbarton-street, Stirling.

Stockport.—Shelter, bowl-house, and pavilion (785*l.*); Messrs. D. Eadie & Co., Ltd., builders, Short-street, Stockport.

Stoke-on-Trent.—Proposed school for girls; Mr. W. Lincoln Copeland, Education Offices, Stoke.

Stretford.—School, Trafford Park; Mr. H. Littler, architect, 16, Ribblesdale-place, Preston.

Sunderland. — Extensions to engineering works for Messrs. Lynn & Co., winch manufacturers; Messrs. W. & T. R. Milburn, architects, 20, Fawcett-street, Sunderland. Engineering works, foundry, etc.; Messrs. W. & T. R. Milburn, architects, 20, Fawcett-street, Sunderland. Two schools; Mr. H. Reed, Education Offices, Sunderland. Pavilion (1,200*l.*) and laundry at hospital; Mr. G. T. Brown, architect, 51, Fawcett-street, Sunderland.

Sutton-in-Ashfield.—Fire-station (350*l.*); Mr. W. Burnley, Surveyor, Town Hall, Sutton.

Swansea.—Coal exchange, Cambrian-place (22,250*l.*); Mr. C. T. Ruthen, architect, Bank-chambers, Heathfield-street, Swansea; Messrs. Billings & Sons, builders, Trafalgar-yard, Oystermouth-road, Swansea. Additions to Ship Inn, Pentreguinea-road, for the Swansea United Breweries, Ltd., Wassail-square, Swansea.

Tarbolton.—School (6,000*l.*); Messrs. J. & H. V. Eaglesham, architects, Wellington-chambers, Ayr.

Tiverton.—Houses; Mr. J. Siddals, Surveyor, Town Hall, Tiverton.

Todmorden.—One hundred and eighty-four houses, Rawson Fields Estate, for Mr. George Collett (Chairman of the Hare Spinning Company), Failsworth.

Torquay. — Secondary school; Architect, County Education Offices, Exeter.

Towyn.—Transmitting-station (60,000*l.*) for the Marconi Wireless Telegraph Company, Ltd., Marconi House, Strand, W.C.

Trimdon Colliery.—Twenty-six houses; Mr. J. Stones, Surveyor, Rural District Council Offices, Sedgefield.

Troon.—Extensions to clubhouse (500*l.*); Mr. A. Black, Surveyor, Town Hall, Troon.

Trowbridge.—New county offices (12,000*l.*); Mr. J. E. Powell, Surveyor, County Offices, Trowbridge. Alterations to premises for the Wilts United Dairies, Ltd. (3,750*l.*); Messrs. Bigwood & Co., builders, Spa-road, Melksham.

Tynemouth.—Additions at St. Saviour's Church; Mr. A. B. Plummer, architect, 13, Grey-street, Newcastle-on-Tyne.

Wakefield.—Restoration of St. Andrew's Church for the Vicar.

Wallsend.—Sixty-six houses, near Rising Sun Colliery, for the Wallsend and Hebburn Coal Company, Ltd., Exchange-buildings, Newcastle.

Warrington.—Proposed rebuilding of works, Bank Quay, for Messrs. H. D. Pochin & Co., Ltd., chemical manufacturers.

Wellingborough. — Buildings for London County and Midland Bank; Mr. A. Whinney, architect, 8, Old Jewry, E.C.; Messrs. Henson & Son, builders, Wellingborough. Isolation hospital; Messrs. Sharman & Archer, architects, 32A, Sheep-street, Wellingborough.

Weymouth.—Alterations to bottling store, Lower Bond-street; Messrs. Crickmay & Son, architects, 49, St. Mary's-street, Weymouth. Alterations to London Hotel; Mr. S. Jackson, architect, Bridge-chambers, Weymouth.

Wick.—Fish market and offices for the Harbour Trustees (3,000*l.*); Mr. G. E. B. Coulcher, Harbour Offices, Wick.

Windsor.—Hospital at Combemere Barracks (10,000*l.*); Messrs. C. H. Hunt & Son, builders, Station Works, High Wycombe.

York.—Proposed open-air school and school for defectives, also enlargement of tram depôt; Mr. F. W. Spurr, Surveyor, City Hall, York.

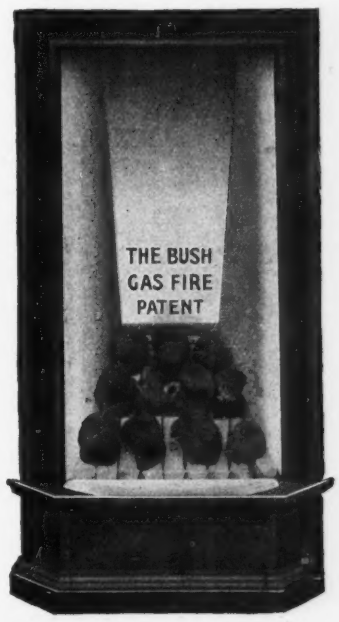
FOREIGN AND COLONIAL.

Polytechnic College, South Africa.

H.M. Trade Commissioner reports that, according to information received from the Commissioner of Customs and Excise at Pretoria, the Provincial Administration of the Orange Free State intend shortly to erect in Bloemfontein a Normal and Polytechnic College, at an estimated cost of 22,500*l.*

TRADE CATALOGUES.

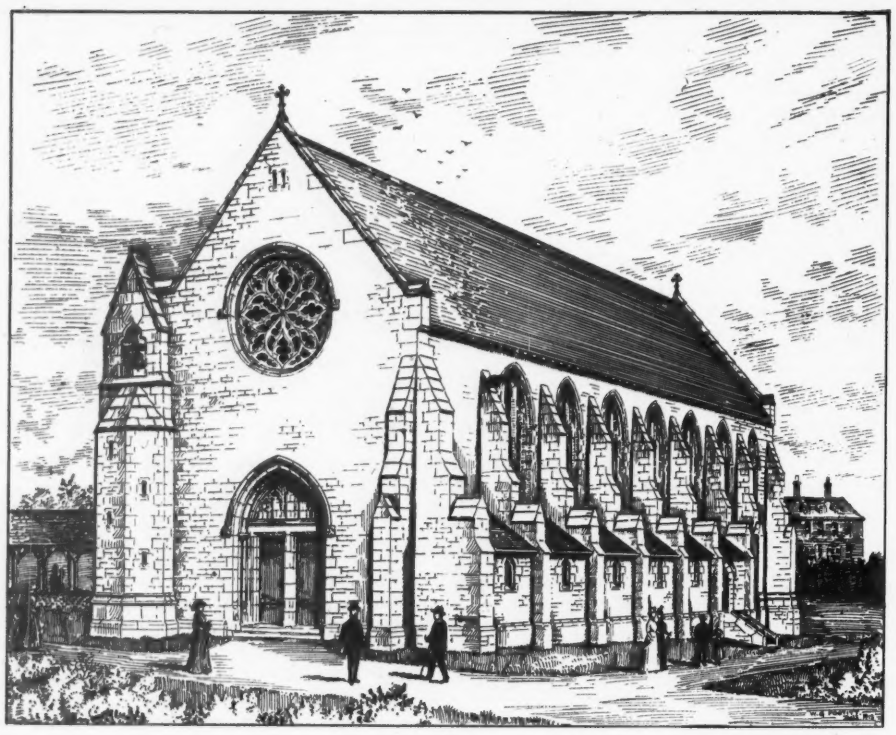
The Nautilus Fire Company, Ltd., of 215, Tottenham Court-road, W., forward us the latest illustrated catalogue of their patent "Bush" fire. The governing principle of this fire is simplicity, the component parts consisting of a plain or ornamental frame in cast-iron or other metal, with or without a canopy, a loose front fitted with an ashpan, and a ventilator fitted in the front of the ashpan to regulate combustion. There are no fire-bars, and the fire, in the most distinctive form of the "Bush" fire, rests on an "island" brick entirely surrounded by a cast-iron grating, which supplies air to the outside of the fire without forcing the draught through the heart, thus securing a slow-burning but always cheerful



fire. The fire-brick linings used in conjunction with the grate radiate the heat into the room, and do not allow it to escape up the flue. The "Bush" gas-fire is an entirely new barless pattern, designed with the idea of combining the conveniences of a gas-fire with the cheerfulness of a coal grate. It can be fitted to any grate, and owing to its construction it has the appearance of a coal fire, the specially made fuel giving out a similar glow. Though the fittings are completely hidden, it is only necessary to draw out the fret to expose the burner, which can be taken out for cleaning purposes without dismantling the arrangement, or removed if it be desired to use the grate for a coal fire. Though standardised for the "Bush" fire, it may be readily altered to suit any other grate.

RIVER TRENT PROTECTION WORKS.

The City Corporation of Nottingham has accepted the tender of Messrs. Gibbons & Turner, of Nottingham (licensed contractors for the "Piketty system" of reinforced concrete), for the execution in reinforced concrete of the River Trent Protection Works, in accordance with the plans of Mr. Arthur Brown, M.Inst.C.E., City Engineer. The work is to be carried out on the "Piketty" system of reinforced concrete construction, which has been selected in competition.



Queen Ethelburga's School, Harrogate.

Designed by the late Mr. C. Hodgson Fowler, F.S.A. Erected by Mr. W. H. Wood, F.R.I.B.A.

QUEEN ETHELBURGA'S SCHOOL, HARROGATE.

ON September 27 the Bishop of Ripon dedicated a new chapel in connexion with the above school. The plan of the chapel consists of a continuous nave and chancel, with narrow passage aisles to the nave, and a sacristy on the north side of the chancel. A stair turret gives access to the western gallery, where the organ will be placed. The north aisle is connected by a corridor with the school buildings. The walls are built of stone, with green slates on the roof, and the floors throughout are of wood blocks.

The chapel will accommodate 340, and is the gift of Lord Mountgarret. The work has been carried out by Messrs. Bowman & Sons, builders, of Stamford, from the designs of the late Mr. C. Hodgson Fowler, F.S.A., under the supervision of Mr. W. H. Wood, F.R.I.B.A., of Durham, and Newcastle-on-Tyne, his successor.

LAW REPORTS.

OFFICIAL REFEREE'S COURT.
(Before Mr. VEREY.)

Decorative and Electrical Work: Action by Messrs. Hampton.

THE hearing has been concluded of the action by Messrs. Hampton & Sons, Ltd., of Pall Mall East, S.W., against Princess Annie de Lusignan, to recover 162*l.* 5s. 11d. for decorative and electrical work done in her flat at 11, Wellington-court, Knightsbridge, S.W., last year.

Mr. Frank Mellor, who appeared for Messrs. Hampton, said the Princess's flat was on the fifth floor, the kitchen and domestic offices being on the floor above. Most of the work was in respect of the fifth floor. The defence was, apparently, an allegation that the work was negligently and unskilfully done, and that 100*l.*, which the defendant had tendered, was sufficient payment. Counsel added that from the first Messrs. Hampton had taken up the position that if anything had been defective they should have been allowed to put it right. They had over and over again expressed the wish to remedy any defects, but the defendant had never given them the opportunity. One of the reasons why they had not had that opportunity was that the Princess had apparently got rid of her lease. Eventually, the plaintiffs, through the courtesy of the present occupier, were permitted to inspect the premises.

Mr. John Harvey Coney, building surveyor, in the employ of the plaintiffs, said he had charge of the work. He repudiated the suggestions as to defects in the work. His firm had only used the best materials. Assuming that there were any defects, witness thought a sovereign would put them right.

Witness said that when the defendant took possession she only complained of the wall-paper in the corridor being wrong; but, added witness, she admitted she had changed her mind a great deal. She also spoke about a ceiling.

Mr. R. B. Mann, of the firm of Messrs. John Mann & Sons, quantity surveyors, of Parliament-street, S.W., said he had inspected the work and considered it to be satisfactory.

Mr. T. E. Haydon, for the defendant, submitted that his client, in tendering before the action and bringing into Court 100*l.*, was amply satisfying the requirements. This was, urged Counsel, a case of *quantum meruit*.

Mr. George A. Hall, F.R.I.B.A., of Victoria-street, S.W., said he had examined the work done by the plaintiffs on behalf of the defendant. With reference to the fastenings in the drawing-rooms, they had not been lacquered for a long time, and witness criticised the material of a picture-rail in the oak-room—a knot had fallen out and another was loose. The ordinary precaution of sandpapering had not been observed. Witness said he would not have passed such work in a flat which let at 360*l.*

The dining-room paper was badly hung and trimmed. The joints were not regular, which would have been the case if the paper had not shrunk. In the bedroom the ceiling was badly done, and knots in the woodwork were showing through the paint. In his opinion, there had been lack of supervision.

Mr. Haydon said that Mr. Martin had given evidence that he had measured up the work and put in a tender, assuming that the work was to be executed on the basis set down in the specifications. Mr. Martin said that a fair price would be 107*l.* Mr. Martin had not examined the work for any defects, but he had noticed that it was poorly done, and he considered 90*l.* was an outside price that ought to be paid to the plaintiffs.

Counsel asked Mr. Hall what he had to say.

Mr. Hall said if the estimate for 107*l.* had been put before him he would have reduced it.

Mr. Haydon: Having regard to the condition of the work when you saw it, it would be easier to tell the defects than when Mr. Martin inspected the premises?—Yes.

What do you say would be a fair value of the work to the Princess?—I should think 90*l.* absolutely.

That is an outside figure?—Yes.

Cross-examined by Mr. Mellor: I am taking it that, in your opinion, the difference between the estimated work which the Princess has had is a difference between 90*l.* and 107*l.*?—Yes.

Witness added that he had made a thorough examination.

Do you think there is any single defect that you did not notice?—I should be surprised to hear of anything that I have omitted.

Other evidence was given for the defendant, and the Official Referee, giving judgment, said that he thought the correspondence showed that the plaintiffs were ready and willing at all times to put right whatever small defects there might be, and he thought that a somewhat unreasonable attitude had been shown on the part of the lady in not giving the plaintiffs that opportunity. The question he had to decide was whether the work had been substantially completed. He had listened with great interest to the arguments advanced by Counsel for the lady, and to the way he had analysed the evidence. On the other hand, his Lordship had had the evidence of Mr. Coney, the plaintiffs' building representative, and that evidence stood uncontradicted. On the whole of the evidence before him he came to the conclusion that the plaintiffs did substantially carry out the contract, that they did the work specified, and, taken on the whole, in a proper manner. He thought, however, that some slight deduction should be made for the cost of making good certain little things. For that he would allow 2*l.* 5s. 11d. Deducting that sum, the plaintiffs were entitled to judgment for 160*l.* and costs.

Mr. Haydon, for the defendant, asked for a stay of execution in case his client desired to appeal.

Mr. Verey: You can take what course you like, but I do not think it is a case in which I ought to do anything.

London Building Law: Borough Councils and District Surveyors.

AT Tower Bridge Police Court Mr. Cecil Chapman gave his decision on the four summonses taken out by Charles Archibald Daubney, District Surveyor, representing the London County Council, against Mr. Robert John Angel, M.Inst.C.E., A.R.I.B.A., Borough Engineer and Surveyor, Bermondsey, for having failed to give building notices in respect of works at Vine-street, Rouel-road, Rotherhithe-street, and Bermondsey-street, and for having begun such works without giving notice.

Mr. Chapman said the District Surveyor of Bermondsey had summoned the Borough Surveyor for failing to give him notice under the London Building Act, 1894, before interfering with and replacing the soil under certain houses in the reconstruction of a sewer passing under a block of houses in one place and in close proximity to the sides of houses in another place. "The claim," he said, "is based upon the proposition that anything done to the foundations of a building, or within 3 ft. of a building, must be 'work' for which notice is required under sect. 145, subsect. (*a*), although the interference was only incidental to the execution of other work which had nothing to do with the buildings. The word 'work' in the section which deals with notice to be given is associated with the words 'building or structure,' and it is natural to infer that it must mean work *ejusdem generis* as building or structure. The cases relied upon for the plaintiff—London County Council *v.* District Surveyors' Institution, Moran & Sons *v.* Marsland, and City of Westminster Council *v.* Watson—do not seem to me to conflict with this view. They show that brick or other work connected with a reservoir comes within the term structure or building, and that a wooden stand erected in a public place for the purpose of sight-seeing is equally a structure. . . . The defendant's case is based upon the contention that work which is not directed to a structure or building is outside the scope of sect. 145, although it may be closely associated with, and even materially affect, a building. In support of this contention, the case of Venner *v.* Macdonnel is relied upon, in which a solid structure of seats within the Agricultural Hall, for the purpose of accommodating hundreds of people, was held not to require notice to the District Surveyor. In my opinion, the reasoning in that case applies directly to the one before me, and, as I imagine, governed the action of local authorities ever since the London Building Act was in force. If it were otherwise, the construction of sewers or the laying of electric cables, or the carrying out of any other works below the surface of London would have been accompanied by endless notices and fees for District Surveyors. Such demands have never yet been heard of, so far as I know, except in two cases, one of which appears to have been successful and one unsuccessful. In my judgment, it is unnecessary to discuss the extent of interference with the subsoil of the houses in this case, because I hold that whatever was done incidentally to a building in the carrying out of a sewer construction, an entirely different operation, is not a work or structure for which notice to the District Surveyor is necessary. The case, therefore, against the Borough Surveyor will be dismissed, with 12 guineas costs."

On the application of Mr. Pasmore, the magistrate consented to state a case. A summons for fees was adjourned *sine die*.

LONDON COUNCILS.

Barnet.—Mr. F. Cude has lodged plans for the erection of a block of flats at the corner of Bedford-avenue and Barnet-hill.

Bermondsey.—The disused tram-track in Spa-road is to be taken up and the roadway, including certain portions outside the track, is to be repaved with pitchings or wood at an estimated cost of 4,500*l.*

Camberwell.—A scheme has been approved for the erection of a convenience at Goose Green at an estimated cost of 900*l.*

Deptford.—Tenders are to be invited for carrying out (1) the drainage work, (2) the formation of roads, and (3) the demolition of cottages, in connexion with the extension of Brockley Cemetery. A plan lodged by Mr. F. Warman for the erection of a building abutting upon Hales-street and Stanhope-street, has been passed.

Finchley.—Plans have been passed for Messrs. Edmondsons, Ltd., for the erection of seven shops and houses in Ballards-lane; also for the Up-to-Date Picture Palaces, Ltd., for the adaptation of the skating rink on the Great North Road into a cinematograph theatre.

Holborn.—Tenders are to be invited for carrying out alterations to the public mortuary in Goldsmith-street, so as to provide for improved accommodation for the caretaker; a private mortuary chamber; a suitable cleansing station, with baths on ground and first floors; and various other improvements to make the building suitable for present and future requirements.

Ilford.—Plans have been passed for Mr. W. J. Hobbs for the erection of three houses in Bethell-avenue and seven in Emerson-road.

Kensington.—Tenders are invited for making up Wallingford-avenue, Balloil-road, Kingsbridge-road, and the extension of Kelfield-gardens.

Lewisham.—A communication has been received from the L.C.C. stating that they have decided to undertake the widening of London-road, Devonshire-road, and Waldram-road, Forest Hill, at an estimated cost of 46,500*l.* The Council have acceded to an application from Messrs. Jarvis & Richards on behalf of the Catford Esate Company, Ltd., to construct a 6-in. sewer from the boundary of their property to the west side of Catford Bridge. The work is to be undertaken by the Council at the cost of the applicants. Plans have been passed for Mr. J. Hughes and Messrs. W. T. Champion & Sons for the erection of six houses in Dowanhill-road, and for additions to Nos. 142 and 4, High-street respectively; as have also plans for Mr. A. Henley Attwater for a picture palace opposite Crofton Park Railway-station, Brockley-road. The following have lodged plans with the L.C.C.:—Mr. W. Goddard, buildings, Lewis-grove; Mr. F. W. Loasby, buildings, Hither Green-lane; Mr. G. A. Lansdown, forming and laying-out new road.

Tottenham.—Plans have been passed for Mr. E. S. Theobald and Mr. Wm. C. Staljes for additions to the factory, in North-grove, of Messrs. A. Beswick & Co., and for additions to the Oceana Laundry, Cornwall-road, respectively.

Wandsworth.—The attention of the Lord Chancellor, H.M. Treasury, and the Office of Works is again to be called to the inadequacy of the building used as the Wandsworth County Court, and to the immediate necessity of a larger building being provided. Tenders are to be invited for paving Otterburn-street, Tooting, and part of Salterford-road, Streatham, as new streets. The following plans have been passed:—Mr. A. Harvey, additions to Convent of the Holy Family, High-street, Tooting; Messrs. Erwood & Morris, addition to St. Mary's Schools, St. Alphonsus-road, South Clapham; Messrs. Holloway Bros. (London), Ltd., four houses off Ellerton-road, Springfield; Messrs. Jones Bros. (Tooting), Ltd., alterations and additions to Nos. 6 and 8, St. Nicholas-road, Balham; Messrs. J. Parnell & Son, additions and alterations to Roehampton House, Roehampton-lane, Putney, S.W.

Willesden.—The Engineer has been directed to report as to the probability of acquiring a suitable site for the erection of swimming and slipper baths. The Education Committee has been authorised to proceed with the erection of temporary schools on the "Doecker" principle, to accommodate 400 children, upon the Bridge-road and College-road sites; also to proceed with the erection of a permanent school on the Dudden Hill site to accommodate in the first instance 400 children, with the possibility of enlargement to 1,200, and finally 1,600 if required. To cover the cost of the work application is to be made to the Local Government Board for sanction to borrow 23,755*l.* Electricity mains are to be extended at an estimated cost of 82*l.* The following plans have been passed:—Messrs. Lawrence & Aitken, additions at Albion Works, Kimberley-road, Willesden-lane; Mr. H. R. Hunter, six houses, Doyle-gardens; Messrs. William Moss & Sons, additions to Workhouse, Acton-lane, for the Guardians; Mr F. W. Heal, alterations to No. 126, High-road, for Messrs. E. G. Harvey, Ltd.; Mr. T. W. Willard, additions at Edinburgh Biscuit Works, Waxlow-road, for Messrs. McVitie & Price; Messrs. John Belcher, R.A., and J. J. Joass, addition to factory, Waxlow-road, Acton-lane, for the British Luxfer Prism Syndicate. Plans have been lodged by Messrs. T. Marcus Houghton, S. Hathaway, and G. S. Valentin for the erection of a picture theatre at rear of No. 159, High-road, Kilburn; a mission-hall in Melville-road, Stonebridge Park, and for extensions to cinema theatre, High-street, Harlesden, respectively.

PATENTS.

APPLICATIONS PUBLISHED.*

23,705 of 1911.—Charles Thomas Lee: Ventilator screens.

26,608 of 1911.—John Willis Cloud: Pipe joint.

28,596 of 1911.—Carl Murer: Machines for moulding plastic substances.

1,920 of 1912.—Richard Henry Annison: Piling, sheeting, and other members for constructional work.

4,006 of 1912.—James Holt: Silencing arrangement for water-waste preventers, cisterns, or the like.

4,118 of 1912.—Albert Barnes: Apparatus for closing water supplies to taps and other fittings.

7,624 of 1912.—Frederick James Kellow: Slab walls.

7,995 of 1912.—Joseph Wilkinson Crosby: Moulds for forming blocks of artificial stone, concrete, and the like.

9,168 of 1912.—Franz Kaiser: Doorlock and safety device therefor.

10,521 of 1912.—The British Reinforced Concrete Engineering Company, Ltd., and Andrew William Storey: Stirrups or shear members for use in reinforced concrete structures.

12,114 of 1912.—Logan Willard Mulford: Concrete skylights, vault-lights, and floor-lights.

13,708 of 1912.—Edward Aloysius Tracy: Paving blocks.

15,955 of 1912.—Anton Drexler: Building blocks.

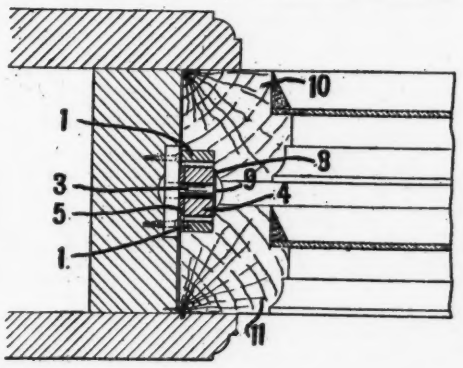
16,254 of 1912.—John William Ewart: Baffles for preventing down draughts in flues.

17,070 of 1912.—Roy Alfred Plumb: Method of rendering cement, mortar, and concrete waterproof.

SELECTED PATENTS.

16,471 of 1911.—James Johnston: Windows.

This relates to windows having a pair of sliding sashes balanced one against the other by means of racks 1 on the sashes 10, 11, engaging pinions 4 mounted on the window-frame.

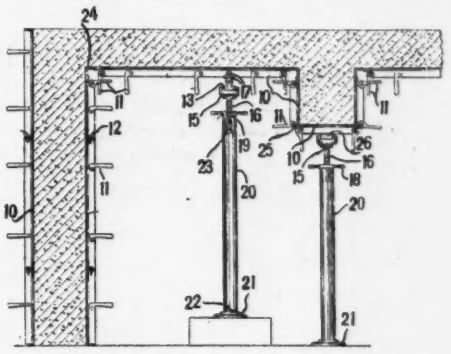


16,471 of 1911.

The pinion 4 is mounted between washers 5 and 8 on a spindle 3, riveted over to form a head 9. A deep draught-rail is also fitted to the sill to enable the upper sash to be opened without admitting air below the lower sash.

16,763 of 1911.—Reichert Manufacturing Company and August Reichert: Moulding concrete floors.

This relates to moulds for casting concrete floors and beams *in situ*, which are supported by T-section or other rails 13, 26, carried by grooved heads 15 on screw-threaded rods 16, adjusted by nuts 18, provided with shoulders 19, to engage the upper ends of pipe lengths 20. The screws are provided with enlargements 23 at the lower ends, to fit within the pipes, which are centred on feet 21 with bosses 22. The edges of the mould-plates 10 are provided with flanges, which are secured



16,763 of 1911.

together by pivoted clamps 11 and pins 12, and are retained on the T-rails 13 by lugs 17. The corners of the moulds are formed by angle-pieces 24, 25, secured to the adjacent mould-plates by the clamps 11.

* All these applications are in the stage in which opposition to the grant of Patents upon them can be made.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

December 4.—By DUNN, SOMAN, & COVERDALE.

Walworth.—3 and 4, Cottage-gr., f., p.	£900
Wandsworth.—58, Trentham-st., u.t. 88 yrs., g.r. 5*l.* 5s., e.r. 24*l.*	175

By EDWIN FOX, BOUSFIELD, BURNETTS, & BADDELEY.

Palmer's Green.—37, Selborne-rd., f., e.r. 50*l.*	540
Peckham.—1 to 13, Grummant-rd., f.g. rents 70*l.* 4s., reversion in 52 yrs.	1,625
East Dulwich.—85, Friern-rd., f., e.r. 32*l.*	350

By J. A. & W. THARP.

Wood Green.—64, Palace Gates-rd., u.t. 85 yrs., g.r. 6*l.* 10s., y.r. 32*l.*	295

By WALTER WINDRUM.

Limehouse.—1 to 13 (odd), Maroon-st., f., w.r. 231*l.* 8s.	1,630
Poplar.—42, Findhorn-st., u.t. 61 yrs., g.r. 3*l.* 15s., w r. 31*l.* 4s.	150

By WYATT & SON.

Chidham, Sussex —Cottage and ¾ acre, *f.*	295
Chichester.—25 and 26, Southgate (s.), and stable, f.	916

By KEMSLEY.

Romford.—21 and 23, Malvern-rd., f., w.r. 36*l.* 8s.	365
16 to 22 (even), Milton-rd., f., w.r. 58*l.* 10s.	640
45, 47, and 49, High-st. (s.), f., y. and w.r. 88*l.* 8	675

December 5.—By HAMPTON & SONS.

Wimbledon.—St. Mary's-rd., Burfield and 1½ acres, f., p.	3,750

By BISLEY & SONS.

Rotherhithe.—3, 5, 21, 23, 25, 27, 37, and 39, Silverlock-st., u.t. 44 yrs., g.r. 32*l.*, w.r. 280*l.* 16s.	1,615

By DAVID J. CHATTELL & SONS.

Mortlake.—1 to 6, Beechcroft-rd., f., y.r. 136*l.*	1,200
Kensington.—21, 25, and 31, Pembroke-rd., u.t. 28 yrs., g.r. 24*l.*, y.r. 270*l.*	3,220
106, Warwick-rd., profit rental 18*l.* 7s., u.t. 28 yrs.	275

By W. HALLETT & CO.

Paddington.—120, Harrow-rd., u.t. 30 yrs., g.r. 16*l.*, e.r. 80*l.*	300
3, St. Mary's-ter., u.t. 33 yrs., g.r. 11*l.* 10s., y.r. 65*l.*	355

By NEWBON & SHEPHARDS.

Caledonian-road.—Wharfedale-rd., Northdown-st., etc., f.g. rents 220*l.*, reversion in 31 and 32 yrs.	4,850
Harringay.—98 and 100, Effingham-rd., f.g. rents 10*l.*, reversion in 78 yrs.	235
Highbury.—17 to 27 (odd), Chatterton-rd., f.g. rents 37*l.* 16s., reversion in 62 yrs.	750

By ANDREW PAUL.

Acton.—Churchfield-rd., Albion b.h., u.t. 38 yrs., g.r. 25*l.*, y.r. 50*l.*	800

By STIMSON & SONS.

Clapham.—53, Gauden-rd., u.t. 49 yrs., g.r. 13*l.*, e.r. 70*l.*	400
1, 3, and 5, Claylands-rd., f., y. and w.r. 120*l.*	1,215
Blackfriars.—21, Bennett-st., f., e.r. 38*l.*	355
Walworth.—8, Lorrimore-sq., u.t. 33 yrs., g.r. 5*l.*, w.r. 52*l.*	175
Southend-on-Sea.—6 and 7, Cliff Town-rd., f.g.r. 50*l.*, reversion in 82 yrs.	1,140
Manor Park.—819, Romford-rd. (s.), f., e.r. 100*l.*	1,200
Leyton.—248 and 252, High-rd. (s.), f., y.r. 85*l.*	895
Southgate-rd.—Nos. 133 and 135, u.t. 15 yrs., g.r. 13*l.*, y.r. 42*l.* and p.	300

By DEBENHAM, TEWSON, RICHARDSON, & CO.

East Dulwich.—17 to 29, 75 to 87 (odd), Pellatt-rd., f.g. rents 84*l.*, reversion in 67 yrs.	1,740
Tooting.—38 to 54 (even), Ascot-rd., f.g. rents 40*l.* 10s., reversion in 93 yrs.	785
26, 28, 30, 40 to 52 (even), 60, 61, 68, 71, and 79, Links-rd., f.g. rents 76*l.* 10s., reversion in 93 yrs.	1,490
New Malden.—55 to 69 (odd), Elm-rd., f.g. rents 49*l.* 7s., reversion in 93 yrs.	910
Bromley, Kent.—8, Langdon-rd., f.g.r. 7*l.* 17s. 6d., reversion in 91 yrs.	175

RECENT SALES—*continued on page 795.*

List of Competitions, Contracts, etc.

For some Contracts still open, but not included in this List, see previous issues. **Those with an asterisk (*) are advertised in this number:** Competitions, —; Contracts, iv. vi. viii. x.; Public Appointments, —; Auction Sales, xviii. Certain conditions beyond those given in the following information are imposed in some cases, such as: the advertisers do not bind themselves to accept the lowest or any tender; that a fair wages clause shall be observed; that no allowance will be made for tenders; and that deposits are returned on receipt of a bona-fide tender unless stated to the contrary.

The date given at the commencement of each paragraph is the latest date when the tender, or the names of those willing to submit tenders, may be sent in.

*** It must be understood that the following paragraphs are printed as news, and not as advertisements; and that while every endeavour is made to ensure accuracy, we cannot be responsible for errors that *may* occur.

Competitions.

JANUARY 1, 1913.—**Belfast.**—DWELLING-HOUSES.—Premiums of 25*l.*, 15*l.*, and 10*l.* Particulars from the City Surveyor, Belfast (1*l.* 1s.).

JANUARY 1, 1913.—**Dublin.**—MUNICIPAL BUILDINGS.—Assessor, Mr. Albert E. Murray, A.R.H.A. Conditions from the City Treasurer, Dublin. Deposit, 2*l.* 2s.

JANUARY 31, 1913.—**Jamaica.**—MUNICIPAL BUILDINGS.—To cost 9,000*l.* Premium 100*l.* Particulars from Messrs. Young, Ltd., 60, Fenchurch-street, E.C. (2s.)

FEBRUARY 3, 1913.—**Harrogate.**—SCHOOL.—The Harrogate Education Committee invite designs for a Council school in Skipton-road. See advertisement in issue of November 1 for further particulars.

FEBRUARY 4, 1913.—**Hayti.**—DESIGNS FOR A NATIONAL PALACE AT PORT-AU-PRINCE.—See "Competition News," December 20, page 748.

FEBRUARY 15, 1913.—**Winnipeg.**—CITY HALL.—Limited to British architects in Canada. Assessor, Mr. Leonard Stokes, F.R.I.B.A.

FEBRUARY 22, 1913.—**Jordanhill, Glasgow.**—PROPOSED TRAINING COLLEGE.—Limited to six firms, named in "Competition News," December 1, 1911, page 635.

MARCH 1, 1913.—**Rangoon.**—MUNICIPAL BUILDINGS.—The Committee of the Municipality of Rangoon invite designs for the new Municipal Buildings. Honoraria of 300*l.*, 200*l.*, and 100*l.* respectively for first, second, and third. See advertisement in August 2 and 30 for further particulars.

MARCH 1, 1913.—**Sofia.**—DESIGNS FOR A ROYAL PALACE AND LAW COURTS.—Particulars from the Commercial Intelligence Branch of the Board of Trade, Basinghall-street, E.C. (see page 173, August 9, and page 350, September 27).

JULY 10, 1913.—TOWN PLANNING SCHEME.—Promoted by the Institution of Municipal and County Engineers. Premiums, 10 guineas, 7 guineas, and 5 guineas.

NO DATE.—**Folkestone.**—PROPOSED KURSAAL.—Cost not to exceed 20,000*l.* Premiums 100, 50, and 25 guineas. See "Competition News," page 542, November 8.

NO DATE.—**Motherwell.**—HIGH SCHOOL.—Dr. Burnet, assessor. Premiums 50*l.*, 30*l.*, and 20*l.*

NO DATE.—**Worthing.**—NEW CHURCH.—Sketch plans are invited for a church to be erected in South Lancing, to cost, when completed, from 4,000*l.* to 5,000*l.* See advertisement in issue of December 13 for further particulars.

Contracts.

BUILDING.

The date given at the commencement of each paragraph is the latest date when the tender, or the names of those willing to submit tenders, may be sent in.

DECEMBER 28.—**Stafford.**—HOME.—Erection of a nurses' home at Stafford Asylum. Drawings and specification with Mr. W. James Nevett, the County Architect, County-buildings, Stafford. Deposit of 2*l.* 2s. for quantities.

JANUARY 3, 1913.—**Cardiff.**—ADDITIONS, ETC.—For additions and alterations to the Imperial Hotel, Mount Stuart-square, Cardiff, for the Alliance Buildings, Cardiff, Ltd. Plans and specifications seen, and quantities from Mr. Sidney Williams, Lic.R.I.B.A., architect, Wharton-street, Cardiff.

JANUARY 4.—**Cardiff.**—HOUSES.—For the erection of two houses, near Zoar Chapel, Bonvilstone, Cardiff. Plans and specifications with Mr. Noar Griffiths, Lower Greenway, Bonvilstone.

JANUARY 4.—**Fowey.**—ALTERATIONS.—For minor alterations and improvements at Whitehouse Landing Place, Fowey, Cornwall. Plans and conditions with the engineer, Mr. H. Bulteel, 31, Whimple-street, Plymouth.

JANUARY 6.—**Fowey.**—HOSPITAL.—For the erection of Cottage Hospital, Fowey. Plans and specification, with conditions of contract, with Mr. C. W. Parkes Lees, architect, Porthpaean House, Llanteglos-by-Fowey. Deposit of 2*l.* 2s.

JANUARY 7.—**Glasgow.**—ROOM.—For the proposed new dining-hall, Coplawhill, Albert-road. Plans seen, and forms of tender from Mr. James Dalrymple, General Manager, 46, Bath-street, Glasgow.

JANUARY 9.—**Maesteg.**—HOUSE, ETC.—For the erection of a drill-hall and house for instructor at Maesteg. Plans and specification seen, and quantities, on deposit of 1*l.* 1s., from Mr. H. Alex. Clarke, architect and surveyor, Briton Ferry.

* JANUARY 11.—**Iwade, Kent.**—SCHOOL.—The Kent Education Committee invite tenders for new Council school of special construction in steel and concrete. See advertisement in this issue for further particulars.

* JANUARY 15.—**High Wycombe.**—POST-OFFICE.—The Commissioners of H.M. Works and Public Buildings invite tenders for alterations to High Wycombe Post Office. See advertisement in this issue for further particulars.

JANUARY 18.—**Taunton.**—BUILDINGS.—The Somerset County Agricultural Association invite tenders for the erection of the showyard buildings, enclosures, etc., for their forthcoming show, to be held at Taunton. Drawings and specification, with schedules and quantities, with Mr. H. O. Samson, Lic.R.I.B.A., Hammet-street, Taunton, Surveyor to the Association.

JANUARY 21.—**London.**—BUILDINGS.—The London C.C. invites tenders for the construction of buildings for public conveniences on the Victoria-embankment, near Blackfriars Bridge. Specifications, drawings, quantities, form of tender, etc., from the Chief Engineer of the Council, Sir Maurice Fitzmaurice, C.M.G., at the County Hall, Spring-gardens, S.W. Deposit of 1*l.*

NO DATE.—**Debenham.**—ENLARGEMENT.—The Managers of the Sir Robert Hitcham Girls' School, Debenham, invite tenders for the enlargement of the school, with cloakroom accommodation, etc. Plans and specification, on deposit of 1*l.* 1s., from Mr. R. G. Fordham, architect, 2, Bolton-villas, Sidegate-lane, Ipswich.

NO DATE.—**Newnham.**—HOUSE.—For the erection of a house at Newnham, Gloucester. Deposit of 1*l.* 1s. for quantities to Mr. L. Willoughby Thomas, architect, Theatre Royal-chambers, St. Mary-street, Cardiff.

NO DATE.—**Torquay.**—ALTERATIONS.—For alterations to business premises, for Mr. Jas. Stevens. Architect, Mr. F. G. Moore, A.M.Inst.C.E., 9-10, Fleet-street, Torquay.

NO DATE.—**Torquay.**—BUNGALOW.—For erection of a bungalow at Livermead, for Prebendary A. P. Wodehouse, M.A. Architect, Mr. F. G. Moore, A.M.Inst.M.E., 9-10, Fleet-street, Torquay.

ENGINEERING, IRON, AND STEEL.

JANUARY 3.—**Dublin.**—HEATING, ETC.—For hot-water heating and ventilation at the new offices for the Commissioners of Public Works, St. Stephen's Green, Dublin. Drawings and specification, on deposit of 1*l.*, from Mr. H. Williams, Secretary, Office of Public Works, Dublin.

JANUARY 6.—**Kegworth.**—TANK, ETC.—For the construction of a Dortmund tank, new mud beds, and other appurtenant works at Kegworth Sewage Farm, Leicestershire. Plans seen, and quantities from the Engineer, Mr. W. H. Radford, C.E., Albion-chambers, King-street, Nottingham, on deposit of 1*l.* 1s.

JANUARY 7.—**Llandovery.**—BRIDGE.—For the erection of a steel bridge over the River Towy, near the Towy Bridge Inn, Rhandirmwyn. Plans, specifications, and quantities with Mr. Henry A. Ellis, M.A., M.S.A., 10, Fisher-street, Swansea.

FEBRUARY 8.—**Bridport.**—BRIDGE.—For the erection of a bridge at Bridport. Plans, specifications, and particulars from the Engineer, Mr. Fredk. Cooper, East-street, Bridport. Deposit of 2*l.* 2s.

JANUARY 8.—**Buntingford.**—TANK.—For the construction of a precipitation tank at the Buntingford Sewage Disposal Works. Plans seen, and form of tender, with specification, from Mr. Ernest G. Thody, the Council's Surveyor, Board-room, Buntingford.

JANUARY 11.—**Chorley.**—ENGINES.—For the supply of two gas-engines and two pumps. Particulars, on deposit of 1*l.*, from Mr. Alban Jolly, Surveyor to the Council, at 9, High-street, Chorley.

NO DATE.—**Lincoln.**—ROAD.—For making a main road from Wragby-road to Greetwell-road, and for sewering and channelling the same. Quantities, on deposit of 1*l.*, from Messrs. W. Watkins & Son, surveyors, St. Edmond's-chambers, Silver-street, Lincoln.

FURNITURE, PAINTING, MATERIALS, etc.

DECEMBER 24.—**Dundee.**—BATHS.—For painter work at Central baths. Specifications seen, and quantities and forms of offer from Mr. Jas. Thomson, City Engineer, 91, Commercial-street, Dundee.

DECEMBER 31.—**Merthyr Tydfil.**—CASTINGS.—For the supply of iron castings. Specification and form of tender from the Borough Engineer, Town Hall, Merthyr Tydfil.

JANUARY 10, 1913.—**Warrington.**—BATH.—For the douche bath installation for the Bolton Council Extension, Latchford, Warrington. Specifications and forms of tender from the Director of Education, Education Office, Sankey-street, Warrington, on deposit of 10s. 6d.

ROADS, SANITARY AND WATER WORKS.

JANUARY 1.—**Barnstaple.**—DRAINAGE.—For drainage work at Bell Meadow. Mr. E. Y Saunders, M.R.S.I., Borough Surveyor, The Strand, Barnstaple.

JANUARY 9.—**Tonyrefail.**—ROADS.—For making-up Station-road and lane connecting Station-road and Collena-road, Tonyrefail. Plans and specification seen, quantities, and form of tender on deposit of 1*l.* from Mr. Thomas Saunders, Surveyor, School-street, Pontyclun.

JANUARY 16.—**Chelmsford.**—STREETS.—For the execution of street improvement works at the corner of Moulsham-street and Baddow-road. Forms of tender, particulars, plans, and specifications at the Borough Engineer's Office, 16, London-road.

JANUARY 22.—**Madras.**—PIPES, ETC.—The Corporation of Madras invites tenders for the supply and delivery of English stoneware pipes and specials, varying from 4 in. to 21 in. internal diameter, and aggregating a total length of about 165 miles. Forms of tender, by Mr. J. W. Madeley, M.A., M.Inst.C.E., M.A.M.Soc.C.E., etc., Special Engineer to the Corporation of Madras, from Messrs. James Mansergh & Sons, Agents to the Corporation, 5, Victoria-street, Westminster, S.W., on payment of 5s.

Auction Sale.

Nature and Place of Sale.	By whom Offered.	Date of Sale.
*BUILDING MATERIALS FROM DEMOLITION, PECKHAM RYE, S.E.—On the Prems.	Veryard & Yates	Jan. 9, 1913

RECENT SALES—*continued from page 793.*

Bethnal Green.—New Tysson-st., (Spaniel Dog b.h.), f.g.r. 15*l.*, reversion in 37 yrs..... £320
7A, 8, and 9, New Tysson-st., f.g. rents 16*l.* 10s., reversion in 37 yrs..... 315
17 to 23 (odd), Turin-st., f.g. rents 28*l.*, reversion in 37 yrs..... 550
Old Ford.—322 to 340 (even), Roman-rd., f.g.r. 10s., reversion in 50 yrs. 490
1 to 69 (odd), Parnell-rd., f.g. rents 128*l.* 10s., reversion in 50 yrs..... 2,620
155 to 173 (odd), Tredegar-rd., f.g. rents 42*l.*, reversion in 50 yrs..... 900
2 to 70 (even), Usher-rd., 21 and 23, Parnell-rd., f.g. rents 9*l.*, reversion in 50 yrs..... 570
Lower Clapton.—19 and 21, Chippendale-st., f.g. r. 11*l.*, reversion in 80 yrs. 215
Walthamstow.—1, 13, 15, 31, to 39 (odd), and 57, Buxton-rd., f.g. rents 36*l.* 10s., reversion in 66 and 77 yrs. 675
7, 8, and 9, Newport-rd., f.g.r. 11*l.* 10s., reversion in 78 yrs 215
41 and 43, Markhouse-rd., f.g. rents 12*l.*, reversion in 76 yrs..... 235
Forest Gate.—65 to 71 (odd), Wyatt-rd., f.g. rents 17*l.*, reversion in 77 yrs. 340
East Ham.—31 and 33, Oakfield-rd., etc., f.g. rents 9*l.*, reversion in 82 yrs..... 170

December 6.—By FULLER, MOON, & FULLER.

Battersea.—56, 58, and 60 Plough-rd. (s.), and l.g.r. 8*l.*, u.t. 54 yrs., g.r. 32*l.*, y.r. 110*l.*..... 700
44 to 50 (even), Plough-rd. (s.), u.t. 54 yrs., g.r. 32*l.*, y. and w.r. 133*l.* 2s. 200

By KEMSLEY.

West Ham.—20 to 32 (even), The Portway, f., w.r. 120*l.* 18s. 735
1, 3, and 5, Gift-la., f., w.r. 39*l.* 160

By PROTHEROE & MORRIS.

Leyton.—30, 32, and 34, William-st., f.g.r. 15*l.* 15s., reversion in 87 yrs. 320
196, Vicarage-rd., f., w.r. 33*l.* 16s. 350
Walthamstow.—168, Boundary-rd. (s), f., w.r. 32*l.* 10s..... 250

December 9.—By MARKS & BARLEY.

Hunsdon, Herts.—Turkey Cock p.h. and 1½ acre, f., y.r. 43*l.* 1,300
Ware, Herts.—High Oak-rd., Windsor Castle b.h., f., y.r. 13*l.* 750
West-st., White Swan p.h., f., y.r. 13*l.* 370

By LEOPOLD FARMER & SONS.

West Hampstead.—54, Kylemore-rd., u.t. 74 yrs., g.r. 7*l.*, w.r. 46*l.* 16s. 235

December 10.—By HORNE & CO.

Dalston.—27, 29, and 31, Queen's-rd., f., y. and w.r. 100*l.* 16s..... 630

By G. H. MASTERMAN & Co.

Belgravia.—28, Chester-st., u.t. 10½ yrs., g.r. 33*l.* 10s., y.r. 325*l.* 1,450
Hendon.—Ravenstone-rd., six plots, f. 100

By GREEN & SON.

Chiswick.—22, Ashchurch Park-villas, u.t. 51 yrs., g.r. 2*l.*, y.r. 40*l.* 365

By STANLEY PARKES & BROWN.

Bowes Park.—114, Palmerston-rd., u.t. 86 yrs., g.r. 10*l.* 10s., y.r. 50*l.*..... 400
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By FREDERICK WARMAN.

West Ham.—12, 14, and 16, Queen's-rd., f., w.r. 58*l.* 10s. 240

By DREWEATT & WATSON.

Enborne, Berks.—Foxgrove Farm, 27 a. 1 r. 23 p., f. 1,090

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PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

Per 1000 Alongside, in River.	£ s. d.
Best Stocks	1 14 0
Picked Stocks for Facings	2 10 0

Per 1000, Delivered at Railway Depôt.

	£ s. d.		£ s. d.
Flettons	1 13 0	Best Blue Pressed Staffordshire	3 15 0
Best Fareham Red	3 12 0	Do. Bullnose	4 0 0
Best Red Pressed Ruabon Facing	5 0 0	Best Stourbridge Fire Bricks	4 0 0

GLAZED BRICKS—

	£ s. d.		£ s. d.
Best White, Ivory, and Salt Glzd. Str'tch'rs	12 7 6	Double Headers	14 17 6
		One Side and two Ends	18 17 6
Headers	11 17 6	Two Sides and one End	19 17 6
Quoins, Bullnose, and 4½ in. Flats	15 17 6	Splays & Squints	17 7 6
D'ble Stretchers	17 17 6		

Second Quality £1 10s. per 1000 less than best.

	s. d.	
Thames and Pit Sand	6 9	per yard, delivered.
Thames Ballast	5 6	" "
Best Portland Cement	36 0	per ton, "
Best Ground Blue Lias Lime	19 0	" "

NOTE—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 13s. 6d. per yard delivered.
Stourbridge Fireclay in sacks 27s. 0d. per ton at rly dpt.

STONE.

Per Ft. Cube.

	s. d.
BATH STONE — delivered on road waggons, Paddington Depôt	1 7½
Do. do. delivered on road waggons, Nine Elms Depôt	1 9
PORTLAND STONE (20 ft. average)—	
Brown Whitbed, delivered on road waggons, Paddington Depôt, Nine Elms Depôt, or Pimlico Wharf	2 3
White Basebed, delivered on road waggons Paddington Depôt, Nine Elms Depôt, or Pimlico Wharf	2 4½

Per Ft. Cube, delivered at Railway Depôt.

	s. d.		s. d.
Ancaster in blocks	1 10	Closeburn Red Freestone	2 0
Beer in blocks	1 6		
Greenshill in blocks	1 10	Red Mansfield Freestone	2 4
Darley Dale in blocks	2 4	Talacre & Gwespyr Stone	2 4
Red Corsehill in blocks	2 3		

YORK STONE—*Robin Hood Quality.*

Per Ft. Cube, Delivered at Railway Depôt.	s. d.
Scappled random blocks	2 10

Per Ft. Super., Delivered at Railway Depôt.

6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3
6 in. rubbed two sides ditto, ditto	2 6
3 in. sawn two sides slabs (random sizes)	0 11½
2 in. to 2½ in. sawn one side slabs (random sizes)	0 7
1½ in. to 2 in. ditto, "	0 6

HARD YORK—

Per Ft. Cube, Delivered at Railway Depôt.	
Scappled random blocks	3 0

Per Ft. Super., Delivered at Railway Depôt.

6 in. sawn two sides landing to sizes (under 40 ft. super.)	2 8
6 in. rubbed two sides ditto	3 0
3 in. sawn two sides slabs (random sizes)	1 2
2 in. self-faced random flags	0 5

SLATES.

Per 1000 of 1200 at Railway Depôt.

In. In.	£ s. d.	In. In.	£ s. d.
20×10 best blue Bangor	13 2 6	20×10 best Eur'ka unfading green	15 17 6
20×12 ditto	13 17 6	20×12 ditto	18 7 6
20×10 1st quality ditto	13 0 0	18×10 ditto	13 5 0
20×12 ditto	13 15 0	16×8 ditto	10 5 0
16×8 ditto	7 5 0	20×10 permanent green	11 12 6
22×10 best blue Portmadoc	12 12 6	18×10 ditto	9 12 6
16×8 ditto	6 12 6	16×8 ditto	6 12 6

TILES.

At Railway Depôt.

	s. d.		s. d.
Best plain red roofing (per 1000)	42 0	Best "Hartshill" brand, plain sand-faced (per 1000)	45 0
Hip and Valley (per doz.)	3 7	Do. pressed (per 1000)	42 6
Best Broseley (per 1000)	50 0	Do. Ornamental (per 1000)	47 6
Do. Ornamental (per 1000)	52 6	Hip (per doz.)	4 0
Hip and Valley (per doz.)	4 0	Valley (per doz.)	3 6
Best Ruabon red, brown, or brindled (Edw'ds) (per 1000)	57 6	Staffords. (Hanley) Reds or Brindled (per 1000)	42 6
Do. Ornamental (per 1000)	60 0	Hand-made sand-faced (per 1000)	45 0
Hip (per doz.)	4 0	Hip (per doz.)	4 0
Valley (per doz.)	3 0	Valley (per doz.)	3 6

WOOD.

BUILDING WOOD.	At per standard. £ s. d.		£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	14 0 0	...	15 10 0
Deals: best 3 by 9	13 10 0	...	14 10 0

WOOD (*Continued*).

BUILDING WOOD (*Continued*)—	At per standard. £ s. d.		£ s. d.
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11 10 0	...	12 10 0
Battens: best 2½ by 6 and 3 by 6	0 10 0		less than 7 in. and 8 in.
Deals: seconds	1 0 0		less thn best.
Battens: seconds	0 10 0	"	"
2 in. by in. and 2 in. by 6 in.	9 10 0	...	10 10 0
2 in. by 4½ in. and 2 in. by 5 in.	9 0 0	...	10 0 0
Foreign Sawn Boards—			
1 in. and 1¼ in. by 7 in.	0 10 0		more than battens.
¼ in.	1 0 0		"
Fir timber: best middling Danzig or Memel (average specification)	At per load of 50 ft. 5 0 0	...	5 10 0
Seconds	4 10 0	...	5 0 0
Small timber (8 in. to 10 in.)	3 17 6	...	4 0 0
Small timber (6 in. to 8 in.)	3 5 0	...	3 10 0
Swedish balks	2 12 6	...	3 0 0
Pitch-pine timber (30 ft. average)	5 5 0	...	6 0 0

JOINERS' WOOD.	At per standard. £ s. d.		£ s. d.
White Sea: first yellow deals, 3 in. by 11 in.	24 10 0	...	25 10 0
3 in. by 9 in.	22 10 0	...	23 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	...	18 0 0
Second yellow deals, 3 in. by 11 in.	19 0 0	...	20 0 0
" " 3 in. by 9 in.	18 0 0	...	19 10 0
Battens, 2½ in. and 3 in. by 7 in.	14 0 0	...	15 0 0
Third yellow deals, 3 in. by 11 in. and 9 in.	14 0 0	...	15 0 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	...	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 10 0	...	22 10 0
Do. 3 in. by 9 in.	18 10 0	...	19 10 0
Battens	14 0 0	...	15 0 0
Second yellow deals, 3 in. by 11 in	16 10 0	...	17 10 0
Do. 3 in. by 9 in.	15 0 0	...	16 0 0
Battens	11 10 0	...	12 10 0
Third yellow deals, 3in. by 11 in.	13 10 0	...	14 10 0
Do. 3 in. by 9 in.	13 0 0	...	14 0 0
Battens	10 10 0	...	11 0 0
White Sea and Petersburg—			
First white deals, 3 in. by 11 in.	15 0 0	...	16 0 0
" " 3 in. by 9 in.	14 0 0	...	14 10 0
Battens	11 10 0	...	12 10 0
Second white deals, 3in. by 11in.	14 0 0	...	15 0 0
" " 3 in. by 9 in.	13 0 0	...	14 0 0
Battens	10 10 0	...	11 0 0
Pitch-pine: deals	19 0 0	...	21 0 0
Under 2 in. thick extra	0 10 0	...	1 0 0
Yellow Pine—First, regular sizes	48 0 0		upwards.
Oddments	32 0 0		"
Seconds, regular sizes	33 0 0		"
Oddments	28 0 0		"
Kauri Pine—Planks per ft. cube.	0 4 6	...	0 6 0
Danzig and Stettin Oak Logs—			
Large, per ft. cube	0 3 0	...	0 3 9
Small " "	0 2 6	...	0 2 6
Wainscot Oak Logs, per ft. cube	0 6 6	...	0 8 0
Dry Wainscot Oak, per ft. super. as inch	0 0 10	...	0 1 0
¼ in. do. do.	0 0 8½	...	—
Dry Mahogany—Honduras, Tabasco, per ft. super. as inch..	0 0 10	...	0 1 1
Selected, Figury, per ft. super. as inch	0 1 6	...	0 2 6
Dry Walnut, American, per ft. super. as inch	0 0 10	...	0 1 0
Teak, per load	18 0 0	...	22 0 0
American Whitewood planks, per ft. cube	0 5 0	...	0 6 0

Prepared Flooring, etc.—	Per square. £ s. d.		£ s. d.
1 in. by 7 in. yellow, planed and shot	0 13 6	...	0 17 0
1 in. by 7 in. yellow, planed and matched	0 14 0	...	0 18 0
1¼ in. by 7 in. yellow, planed and matched	0 16 0	...	1 0 0
1 in. by 7 in. white, planed and shot	0 12 0	...	0 14 6
1 in. by 7 in. white, planed and matched	0 12 6	...	0 15 0
1¼ in. by 7 in. white, planed and matched	0 15 0	...	0 16 6
¾ in. by 7 in. yellow, matched and beaded or V-jointed brds.	0 11 0	...	0 13 6
1 in. by 7 in. " "	0 14 0	...	0 18 6
¾ in. by 7 in. white " "	0 10 0	...	0 11 0
1 in. by 7 in. " "	0 12 9	...	0 15 0

6 in. at 6d. to 9d. per square less than 7 in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.		£ s. d.
Rolled Steel Joists, ordinary sections	8 10 0	...	9 10 0
Compound Girders, ordinary sections	10 0 0	...	11 0 0
Steel Compound Stanchions	11 10 0	...	12 10 0
Angles, Tees, and Channels, ordinary sections	10 0 0	...	11 0 0
Flitch Plates	10 0 0	...	11 0 0
Cast Iron Columns & Stanchions, including ordinary patterns	8 0 0	...	8 10 0

METALS.

	Per ton, in London. £ s. d.		£ s. d.
IRON—			
Common Bars	9 0 0	...	9 10 0
Staffordshire Crown Bars, good merchant quality	9 5 0	...	9 15 0
Staffordshire "Marked Bars"	11 0 0	...	—
Mild Steel Bars	9 5 0	...	9 15 0
Hoop Iron, basis price	10 0 0	...	—
" " Galvanised	17 10 0	...	—
(*And upwards, according to size and gauge.)			
Sheet Iron Black—			
Ordinary sizes to 20 g.	10 5 0	...	—
" " 24 g.	11 5 0	...	—
" " 26 g.	12 15 0	...	—
Sheet Iron, Galvanised, flat, ordinary quality—			
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	15 10 0	...	—
Ordinary sizes to 22 g. and 24 g.	16 0 0	...	—
" " 26 g.	17 0 0	...	—
Sheet Iron, Galvanised, flat, best quality—			
Ordinary sizes to 20 g.	18 10 0	...	—
" " 22 g. and 24 g.	19 0 0	...	—
" " 26 g.	20 10 0	...	—

METALS (*Continued*).

IRON (*Continued*)—	Per ton, in London. £	s.	d.
Galvanised Corrugated Sheets—			
Ordinary sizes, 6ft. to 8ft. 20 g.	15	0	0 ... —
" " 22 g. and 24 g.	15	5	0 ... —
" " 26 g.	16	15	0 ... —
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. to 20 g. and thicker	12	10	0 ... —
Best Soft Steel Sheets, 2 g. & 24 g.	13	10	0 ... —
" " " 26 g.	15	10	0 ... —
Cut Nails, 3 in. to 6 in.	11	0	0 ... 11 10 0

(Under 3 in., usual trade extras.)

LEAD, &c.

Delivered in London.

	£	s.	d.
LEAD—Sheet, English, 4lb. and up	22	2	6 ... —
Pipe in coils	22	12	6 ... —
Soil pipe	25	12	6 ... —
Compo pipe	25	12	6 ... —
ZINC—Sheet— In casks of 10 cwt.			
Vielle Montagne	33	15	0 ... —
Silesian	33	10	0 ... —

Zinc, in bundles, 1s. per cwt. extra.

COPPER—				
Strong Sheet per lb.	0	1	1	... —
Thin "	0	1	2	... —
Copper nails "	0	1	0	... —
Copper wire "	0	1	0	... —
BRASS—				
Strong Sheet "	0	1	0	... —
Thin "	0	1	1	... —
TIN—English Ingots "	0	2	3	... —
SOLDER—Plumbers' "	0	0	11	... —
Tinmen's "	0	1	2½	.. —
Blowpipe "	0	1	4½	.. —

ENGLISH SHEET GLASS IN CRATES OF STOCK SIZES.*

Per Ft., Delivered.

15 oz. thirds	2½d.	26 oz. fourths	4d.
" fourths	2d.	32 oz. thirds	5½d.
21 oz. thirds	3½d.	" fourths	4½d.
" fourths	3d.	Fluted Sheet, 15 oz.	3d.
26 oz. thirds	4½d.	" 21 oz.	4d.

ENGLISH ROLLED PLATE IN CRATES OF STOCK SIZES.*

Per Ft., Delivered.

⅛ Rolled plate	2½d.	Figured Rolled, Oxford Rolled, Oceanic, Arctic, Muffled, and Rolled Cathedral, white	3½d.
⅛ Rough rolled and rough cast plate	2½d.		
¼ Rough rolled and rough cast plate	3d.	Ditto, tinted	5d.

* Not less than two crates.

OILS, &c.

		£	s.	d.
Raw Linseed Oil in pipes	per gallon	0	2	5
" " in barrels	"	0	2	6
" " in drums	"	0	2	7
Boiled " in barrels	"	0	2	7
" " in drums	"	0	2	10
Turpentine in barrels	"	0	2	5
" in drums	"	0	2	7
Genuine Ground English White Lead, (In not less than 5 cwt. lots)	per ton	30	5	0
Red Lead, Dry	"	26	12	6
Best Linseed Oil Putty	per cwt.	0	10	6
Stockholm Tar	per barrel	1	12	0

VARNISHES, &c.

	Per gallon. £	s.	d.
Fine Pale Oak Varnish	0	8	0
Pale Copal Oak	0	10	6
Superfine Pale Elastic Oak	0	12	6
Fine Extra Hard Church Oak	0	10	0
Superfine Hard-drying Oak, for seats of Churches	0	14	6
Fine Elastic Carriage	0	12	9
Superfine Pale Elastic Carriage	0	16	0
Fine Pale Maple	0	10	0
Finest Pale Durable Copal	0	18	0
Extra Pale French Oil	1	1	0
Eggshell Flating Varnish	0	18	6
White Pale Enamel	1	4	0
Extra Pale Paper	0	12	0
Best Japan Gold Size	0	10	0
Best Black Japan	0	16	0
Oak and Mahogany Stain	0	9	0
Brunswick Black	0	8	0
Berlin Black	0	16	0
Knotting	0	10	0
French and Brush Polish	0	10	6

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TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 6 p.m. on Wednesday.* [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is stated, nor any list in which the lowest Tender is under 100*l.* unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

LONDON.—For erection of fire brigade station and dwellings at Silvertown, West Ham, E., for the Corporation. Mr. J. G. Morley, Borough Engineer:—

A. & S. Wheater	£8,199	F. J. Coxhead	£7,200
Leslie & Co., Ltd.	7,919	S. E. Moss	7,150
Newman, Ltd.	7,705	J. W. Jerram	6,915
E. Proctor & Sons	7,699	A. E. Symes, Stratford*	6,914
W. Payne	7,499	O. P. Drever	6,820
H. C. Horswill	7,493		
F. & G. Foster	7,455		

LONDON.—For building a relief-station at Blackwall-lane, East Greenwich, for the Guardians. Mr. A. Roberts, F.R.I.B.A., 92, London-street, Greenwich:—

F. & T. Thorne	£1,632	F. Webster & Son	£1,287
J. & C. Bowyer	1,450	T. H. Sawyer & Son	1,285
Griggs & Son	1,396	H. N. Martin	1,258
R. A. Lowe & Co.	1,389	E. Mills	1,257
W. Mills & Son, Ltd.	1,379	H. Groves	1,236
E. Procter & Sons	1,339	W. S. Sharpin	1,189
W. Nash	1,295	F. J. Gorham, Point Hill, Greenwich‡	1,033
J. Shorter & Co.	1,290		

‡ Recommended to the Local Government Board for acceptance.

MATLOCK.—For additions to the Town Hall. Mr. J. Turner, Borough Surveyor, Matlock:—

J. W. Wildgoose	£248	F. Hopkinson	£233
W. Bowden	245	E. W. Taylor*	233

[All of Matlock.]

TORQUAY.—For proposed bungalow at Torquay, for Mr. C. F. Shewell. Mr. F. G. Moore, architect, A.M.Inst.M.E., 9 and 10, Fleet-street, Torquay:—

R. F. Yeo & Sons	£499 10	G. Webber	£445 10
R. E. Narracott	472 0	Phare & Son‡	435 0

‡ Recommended for acceptance.

WEST HAM.—For the erection of a Handicraft Centre adjoining the Upton-lane School, Forest Gate, for the West Ham Education Committee. Messrs. William & John H. Jacques, architects, 2, Fen-court, E.C.:—

W. J. Maddison	£919 0	S. Blow, Ltd.	£779 19
J. J. Quarterman	900 0	A. E. Symes	777 0
A. Webb	899 0	J. Barker & Co.	745 0
J. W. Jerram	896 0	H. C. Horswill	737 0
W. J. Clemens	833 10	J. T. Luton, Stratford*	697 0
F. J. Coxhead	817 0		
Turnbull & Son	800 0		

WEST HAM.—For the supply of school desks, for the West Ham Education Committee:—

Educational Supply Association	£921	19	8
North of England School Furnishing Co.	855	18	10
Kingfisher, Ltd.	790	6	4
Wake & Dean, Ltd.	758	13	0
Hobbies, Ltd.	748	13	0
Frazers Joinery Co., Ltd., Norwich*	700	14	8

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Asphalte.—The Seyssel and Metallic Lava Asphalte Co. (Mr. H. Glenn), Office, 42, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds and milk-rooms, granaries, tun-rooms, and terraces. Asphalte Contractors to Forth Bridge Co. T.N. 2644 Central.

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CHURCH OF SANTO SPIRITO. FLORENCE. ITALY.

SCALE OF FEET.

SACRISTY was erected between 1489–96. by GIULIANO DA SAN GALLO associated with SIMONE del POLLAIUOLO.

VESTIBULE or LOGGIA was erected about the year 1490. by ANDREA da MONTE SANSOVINO: all of blue stone.

TRANSVERSE SECTION THRO' NAVE. VESTIBULE. AND SACRISTY.

Tinted portions indicate the Blue stone [Pietra Serena] used.

Plaster.

Plaster.

Plaster.

Street Level.

243' · TOWER · 46' · SACRISTY · 19' · LOGGIA · 11' 21' · CHURCH · 42' 4' 21' 53'

$

CHURCH OF SANTO SPIRITO.
FLORENCE ITALY

HALF PLAN OF DOME
AT WINDOW LEVEL.

LONGITUDINAL
SECTION THROUGH
NAVE OF CHURCH

CHURCH OF SANTO SPIRITO. FLORENCE, ITALY.

ERECTED by BRUNELLESCHI between 1433 & 1487.

CAMPANILE SHEWN IN OUTLINE ONLY WAS BUILT LATER BY BACCIO d'AGNOLO.

THE FRONT FAÇADE IS FLAT. WITH PAINTED ARCHITECTURE VERY MUCH DAMAGED.

Scale of feet:

HALF PLAN OF DOME AT WINDOW LEVEL.

LONGITUDINAL SECTION THROUGH NAVE OF CHURCH.

Tinted portions indicate the Blue Stone [pietra Serena] used.

Ceiling is flat with painted octagonal coffering.

Sprague & Co., Ltd., Printers, 69 & 70, Dean St., Soho W.

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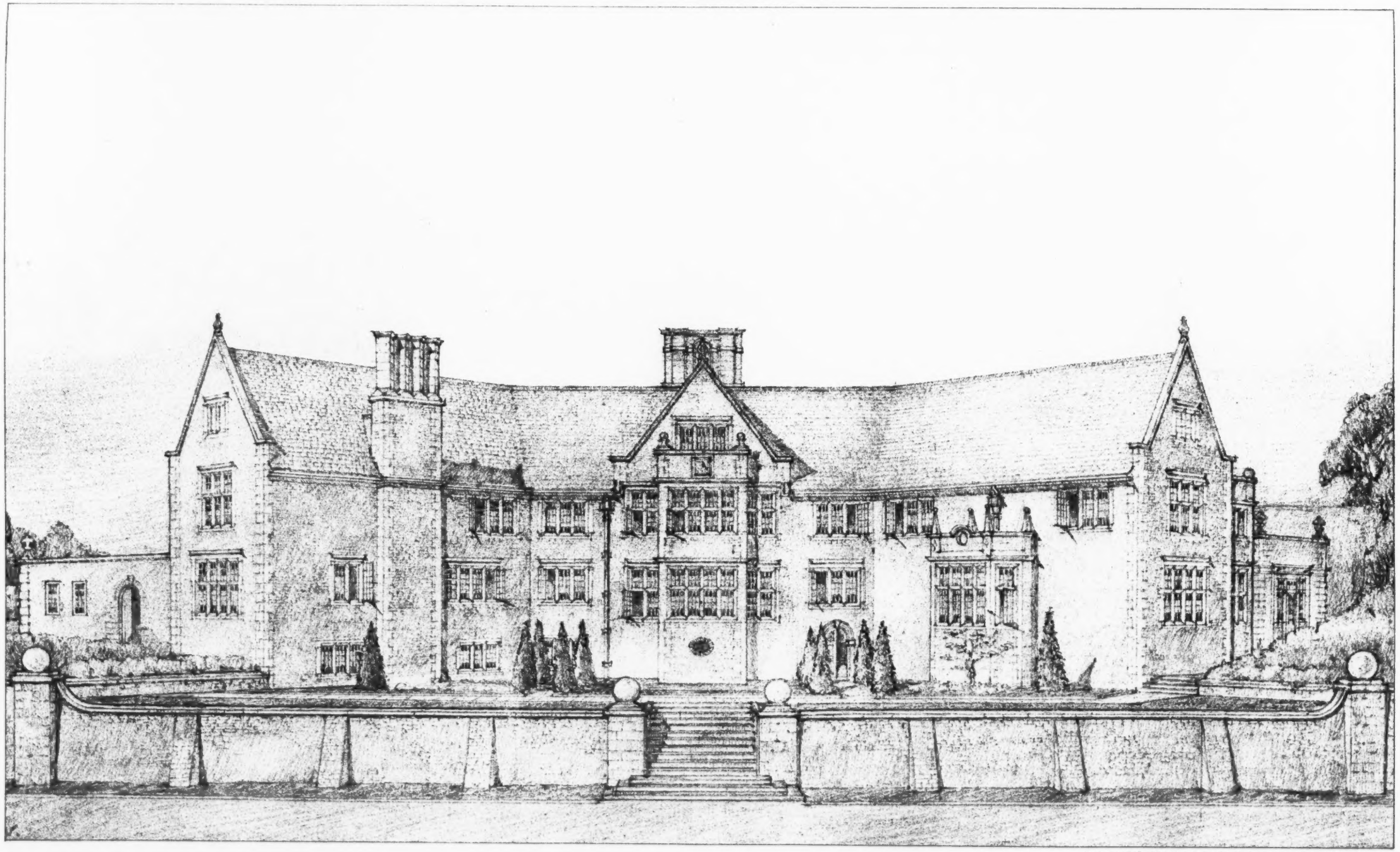

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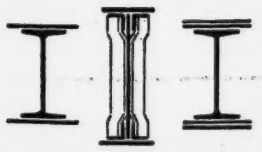

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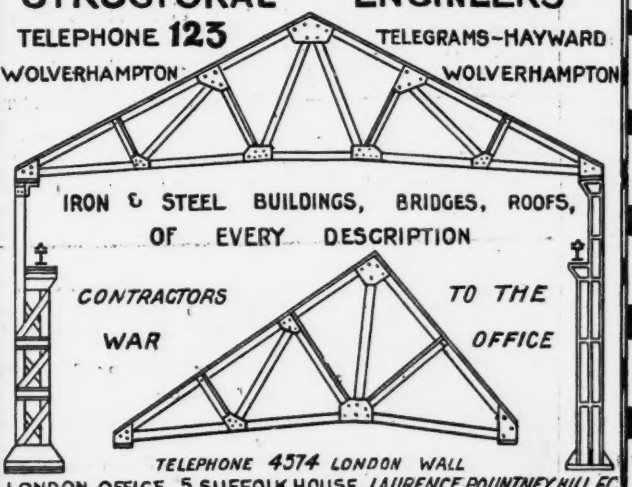

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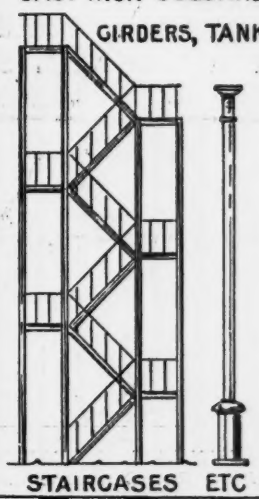

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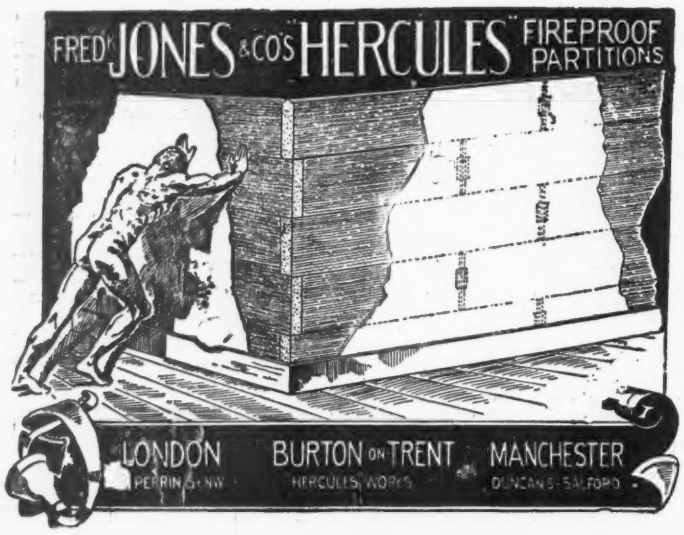

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The Commissioners do not bind themselves to accept the lowest or any Tender.

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H.M. Office of Works, etc.
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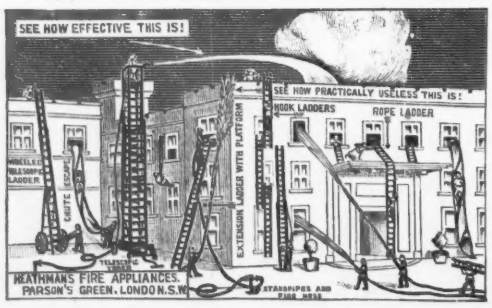

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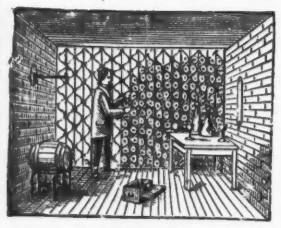

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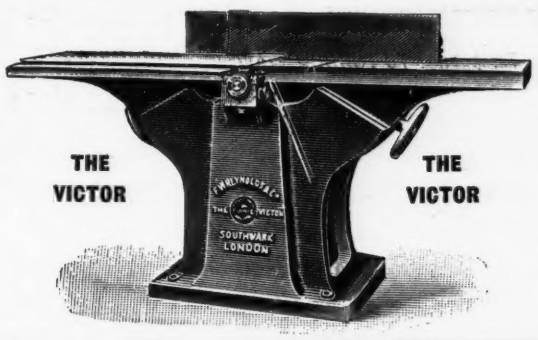

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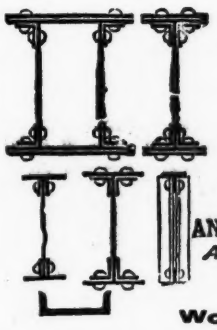

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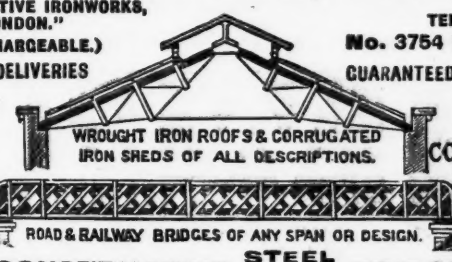

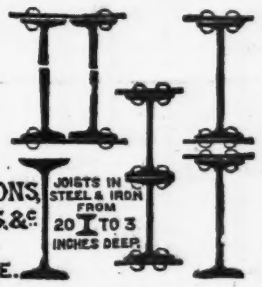

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Any person desiring to Tender and to receive a copy of the bill of quantities must send in his name and address, accompanied by a deposit of 1l., so as to reach the undersigned not later than ONE o'clock on WEDNESDAY, the 1st JANUARY, 1913

The deposit will be returned provided the Tenderer shall have sent in and not withdrawn a bona-fide Tender.

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Tenders, on forms which will be supplied with the bill of quantities, must be enclosed in a sealed envelope endorsed "Iwade New Council School—Tender," and sent or delivered to E. C. HARRIS, Esq., 76, High-street, Sittingbourne, Kent, so as to reach him not later than TEN a.m. on SATURDAY, the 11th JANUARY, 1913.

The Committee do not bind themselves to accept the lowest or any Tender.

By Order of the Committee.
FRAS. W. CROOK,
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Caxton House,
Westminster, S.W.
16.12.1912.

[*See also page* viii.

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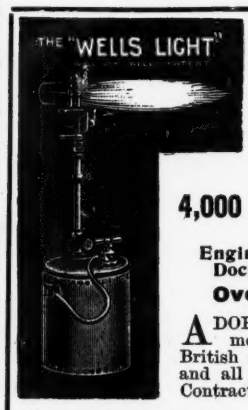

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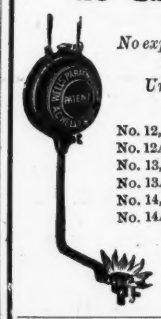

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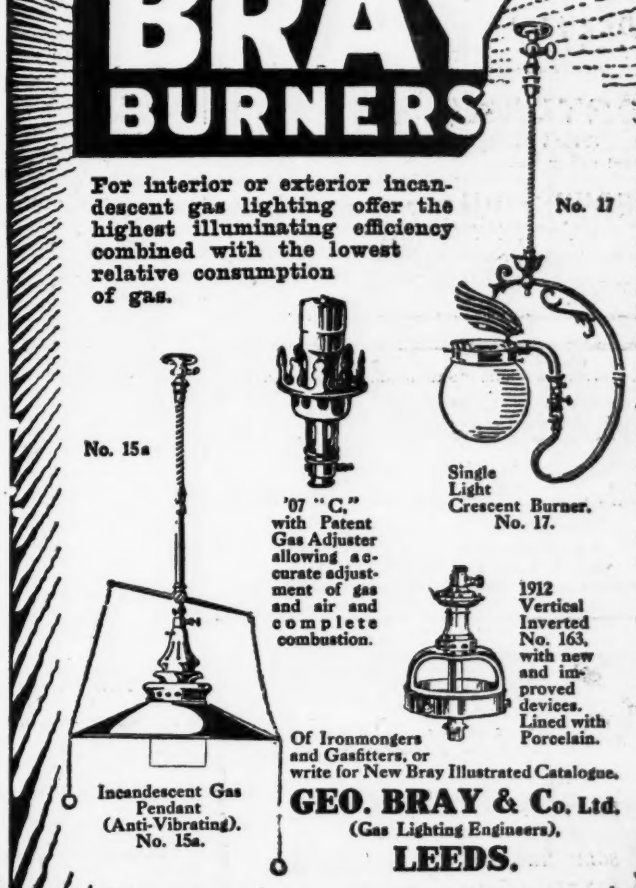
For interior or exterior incandescent gas lighting offer the highest illuminating efficiency combined with the lowest relative consumption of gas.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CONTRACTS (*continued from page* vi.).

HAMLET of MILE END OLD TOWN.
TO CONTRACTORS AND BUILDERS.

The Guardians of the Poor of the Hamlet of Mile End Old Town invite TENDERS from persons willing to Contract for TAKING DOWN and REBUILDING PARAPET and certain OTHER WORKS at Nos. 31 and 32, Tredegar-square, Mile End, E., in accordance with the specifications and conditions and form of Tender prepared by their Architect, Mr. EDMUND J. HARRISON, of 9, Gray's Inn-square, W.C., copies of which may be obtained not later than the 31st DECEMBER, 1912, of the CLERK to the GUARDIANS, Bancroft-road, E., upon depositing the sum of 1l. 1s., which will be returned on receipt of a bona-fide Tender on the form supplied.

Tenders must be sealed and addressed to the GUARDIANS, and delivered at the undermentioned offices not later than TWELVE o'clock NOON on THURSDAY, the 2nd JANUARY, 1913, endorsed "Tender for Rebuilding Parapet."

Persons Tendering will be required to state in their Tender that they pay such rates of wages and observe such hours of labour as are generally accepted as fair in the trade.

The Guardians do not bind themselves to accept the lowest or any Tender.

(By Order)
BENJAMIN CATMUR,
Clerk to the Guardians.

Guardians' Offices,
Bancroft-road,
Mile End, E.
12th December, 1912.

[*See also page* x.

Agents:
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P. J. BYRNE & Co., 7, LOWER ABBEY ST., DUBLIN.
R. H. HOWES CONSTRUCTION Co., 105, WEST 40TH ST., NEW YORK, U.S.A.
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Makers of
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(Burnt from the well-known Beds of the Lower Lias Formation).

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Delivered to any station, and carted on site in London and Birmingham.

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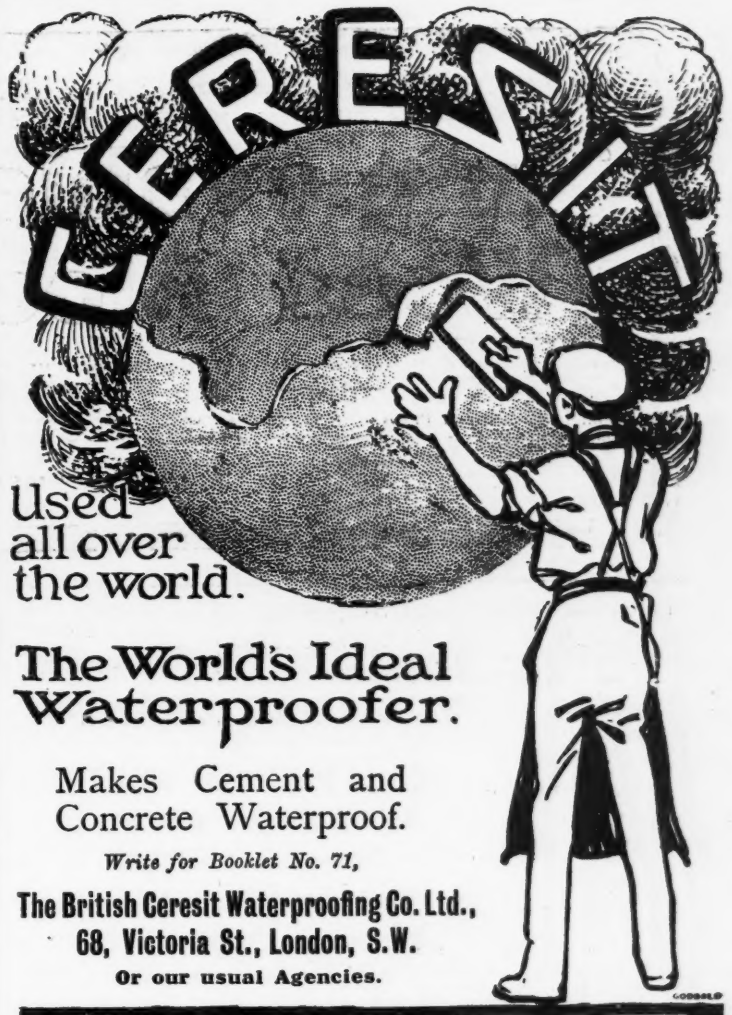

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CONTRACTS (*continued from page* viii.).

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Each Contractor must deposit with his Tender a 50*l.* Bank of England note or crossed cheque of equal value. As soon as a Tender has been accepted by the Committee such deposit will be returned to the unsuccessful Tenderers. In the case of the successful Tenderer the deposit will be returned on the Contract being signed.

Plans and specifications may be seen, and forms of Tender and any other information obtained, at the Office of the Committee's Architect, Mr. R. L. CURTIS, 11 and 12, Finsbury-square, London, E.C., on ANY WEEKDAY except Saturday, between the hours of TEN and FIVE.

Applications for bills of quantities must be made to the ARCHITECT not later than 31st DECEMBER, 1912.

Tenders, on the printed form, must be delivered to me not later than THREE o'clock in the AFTERNOON of TUESDAY, 21st JANUARY, 1913.

The Committee do not bind themselves to accept the lowest or any Tender.

The Contractor shall, in the execution of his Contract, observe and fulfil the obligations upon Contractors contained in the bills of quantities and specification.

The Contractor will be required to undertake that at least two-thirds of the men employed on the work are resident in the Borough of East Ham, such men to have resided in the borough for at least three months.

(By Order)
F. R. THOMPSON,
Secretary.

Education Office,
Town Hall,
East Ham, E.
7th December, 1912.

Refer also to "Too Late" column, page xv.

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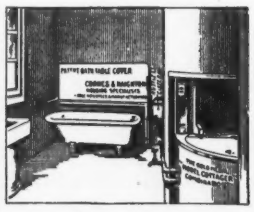

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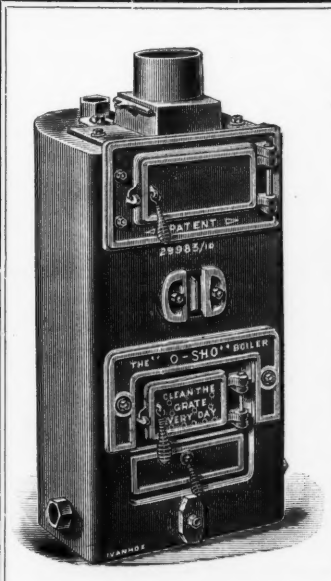

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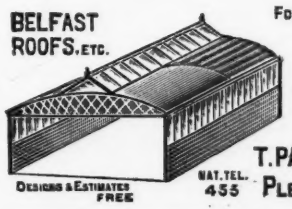

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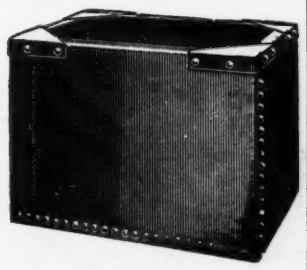

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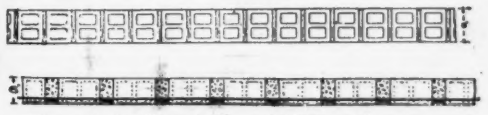
The principle upon which the Kleine System is based secures immense strength, and, as will be seen from the accompanying illustration, the iron tension rods are firmly embedded in cement mortar between the hollow bricks, thus forming a homogeneous slab of brick, cement mortar, and iron.



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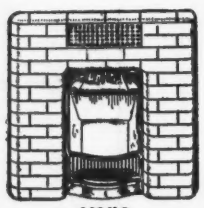

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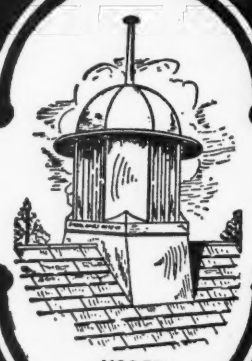

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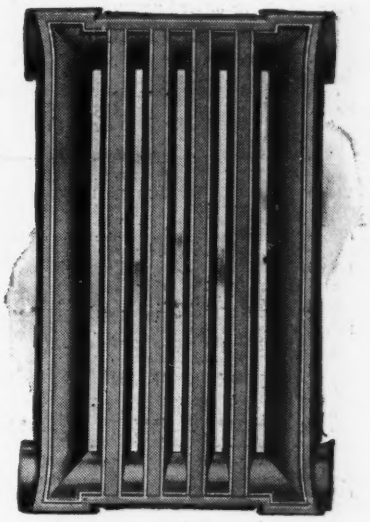

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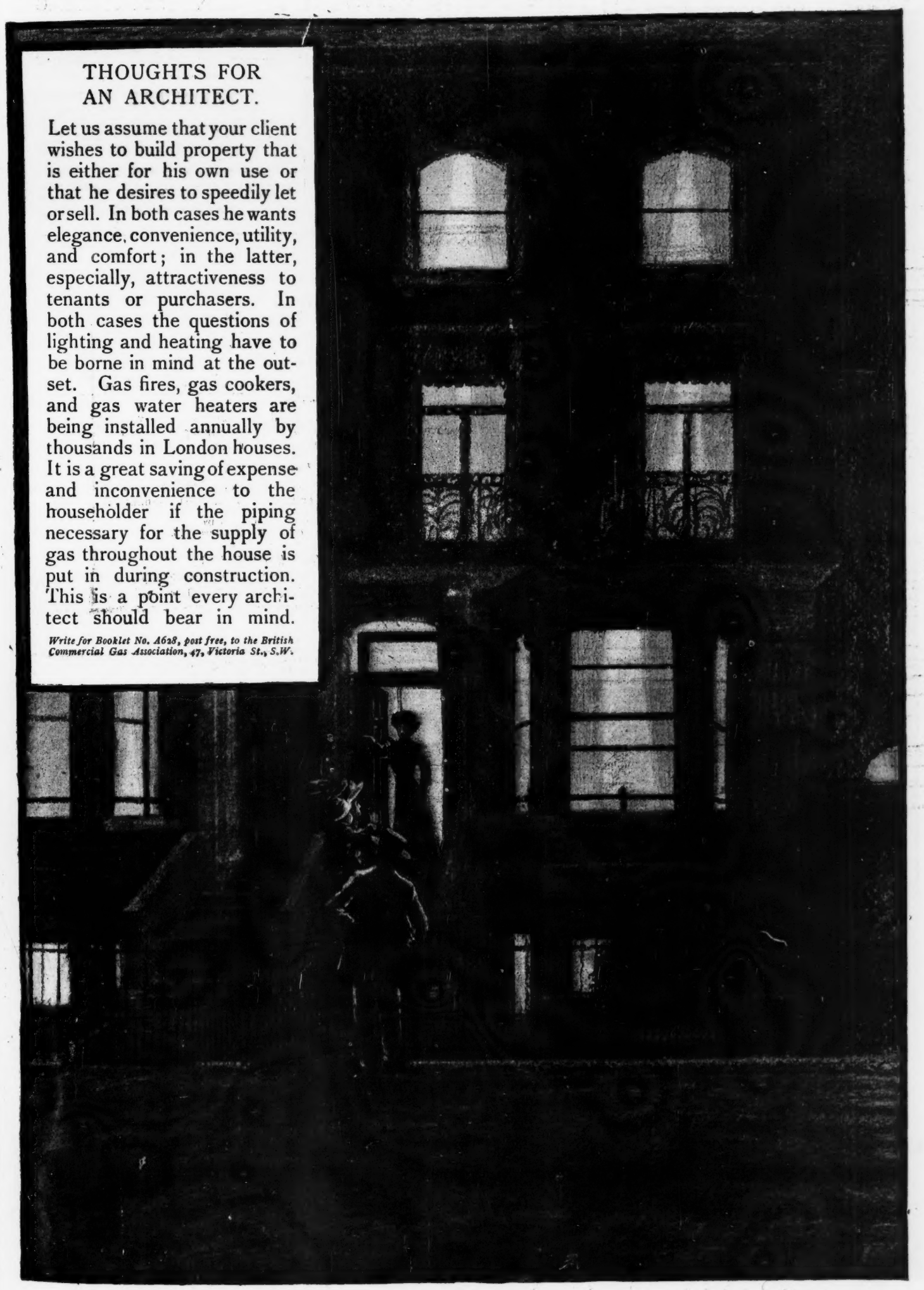

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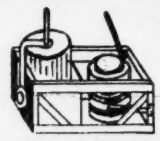

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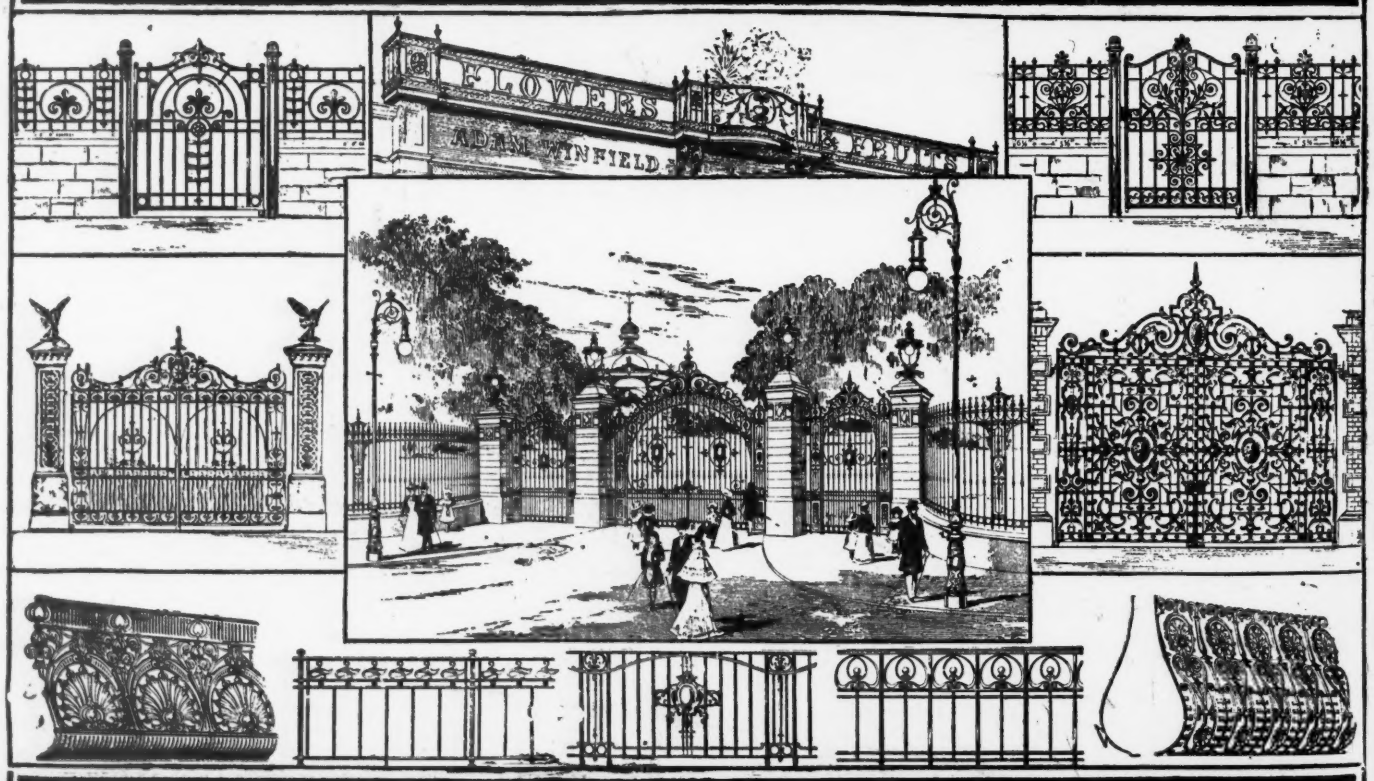

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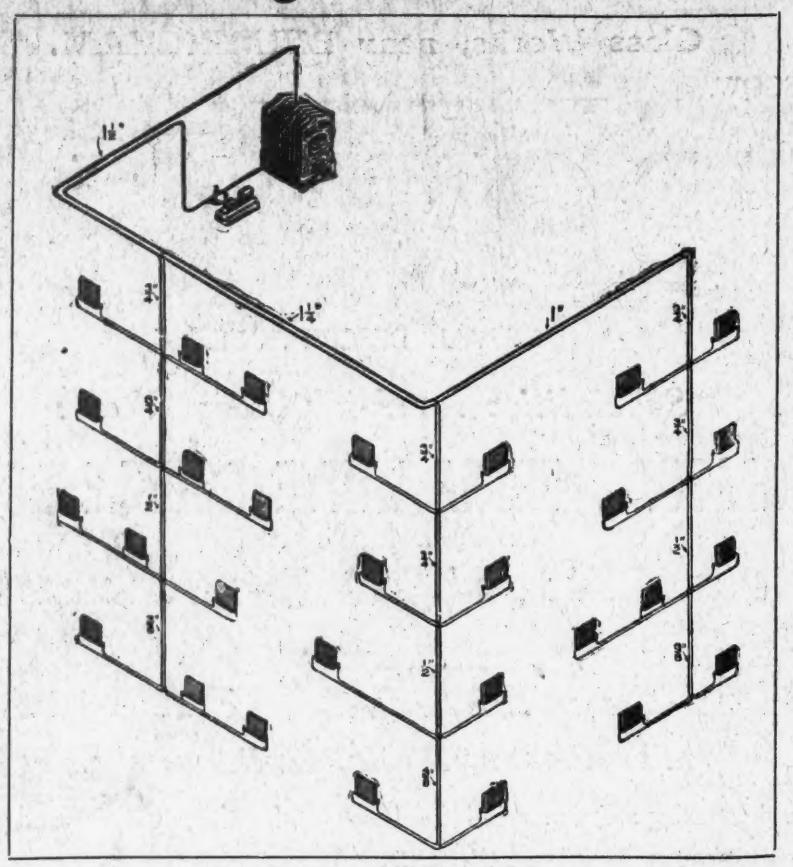

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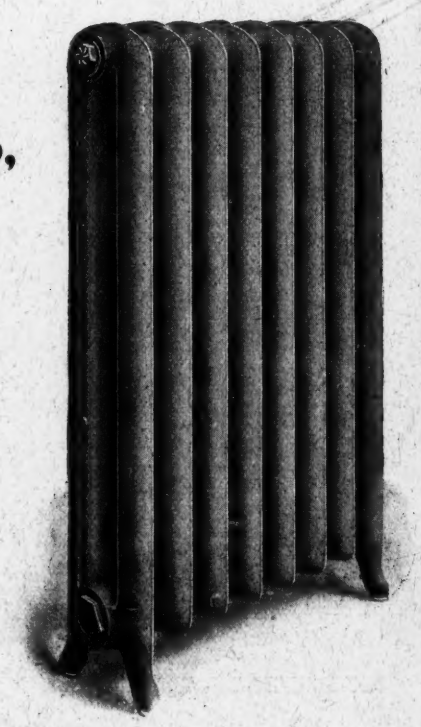

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